

JPRS-UEA-85-026

15 July 1985

USSR Report

ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

No. 4, April 1985

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15 July 1985

USSR REPORT
ECONOMIC AFFAIRS

EKO: ECONOMICS AND ORGANIZATION
OF INDUSTRIAL PRODUCTION

No. 4, April 1985

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA published in Novosibirsk.

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Figure 1

April 11 1945

13 March 1985

: 142,919

: Izdatel'stvo "Nauka", "Ekonomika
i organizatsiya promyshlennogo
proizvodstva", 1985

ADMINISTRATIVE DECISION-MAKING DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMISHLENNOGO PROIZVOJSTVA (ECO) in Russian No 4, Apr 85 pp 3-31

[Discussion at meeting of "Directors' Club" including: R. A. Belousov, V. T. Boltivets, P. V. Gorshkov, V. K. Gupalov, I. N. Gubaydullin, V. G. Iar'yalov, N. B. Mironosetskiy, B. V. Prilepskiy, V. D. Rechin, Yu. I. Tyshkov, V. P. Shapovalov, Yu. G. Shelyukhin and I. P. Zhukrenko: "The Cost of a Management Decision"]

[Text] Today the problem of preparing and adopting administrative decisions in the associations and enterprises is especially crucial. Their rights are being expanded and their responsibility for the final results of production and economic activity are increasing.

What is the relationship between the strategic and operational decisions made by the director? What should it be? Does the director deal with the future adequately or do current daily concerns close off the horizons of the future to him? How effective are the forms of preparing, adopting and implementing administrative decisions? These questions were discussed by managers of enterprises in conjunction with scientists at the regular meeting of the Directors' Club. And then, following the example of the Divnogorsk Plant for low-voltage equipment, at which the meeting of the Directors' Club took place, they conducted their own conference on preparing strategic administrative decisions related to the development of the plant.

You have before you an abridged record of the meeting of the Directors' Club. It was conducted by the editor in chief of the magazine, Academician A. G. Aganbegyan.

Strategy--This Is the Main Thing

R. A. Belousov, doctor of economic sciences, professor, chief of the department of administration of the Academy of Social Sciences under the CPSU Central Committee, Moscow: The management decision is that center in which

the entire totality of management relations and actions is concentrated. I have in mind the decision not only of an administrative or directive act, but as a resolution to a problem, as a surmounting of difficulties and contradictions in production. The document itself--the order, the decree, the instructions--is one of the elements of this process.

Changing the national economy over to the intensive path of development dictates the need to pay greater attention to decisions of a strategic nature. What, in my opinion, should be included among them? First and foremost problems of scientific and technical progress. In world practice one can see a sharp acceleration of the updating of the active part of technological equipment. This is equipment which is not physically worn out. Certain less-developed countries purchase it at the price of scrap metal and it works excellently. This equipment is obsolete: it does not correspond to the modern level of technology.

We have longer time periods for updating equipment. The normative is 10-11 years, but in practice it is 20 years. This is an essential problem. Its solution at enterprises and in associations cannot be put off, and it is necessary to act without waiting for instructions from above. The example of enterprises of Sverdlovsk Oblast shows that much can be done through our own efforts. Here for the third five-year plan in a row almost all of the increase in output has been achieved as a result of reconstruction and technical reequipping. Strategic decisions concerning methods and ways of reconstruction are developed by the enterprises and associations themselves. This practice was approved by the party Central Committee. It was discussed in EKO in 1974 and 1983.¹ Unfortunately, it has not caught on.

The next object of strategic decisions, it seems to me, are the skills of personnel. If we wish to achieve a sharp increase in the effectiveness of production, the question of skills must be considered much more extensively. Technological reconstruction requires reconstruction of personnel as well! And this is inseparably related to another group of strategic problems--social problems. They must also be the subject of strategic decisions.

They say that the director does not have sufficient rights and independence and that this makes it difficult to make strategic decisions. But the investigations we have conducted have shown that not every manager is inclined to make large decisions involving initiative. When the enterprises encounter important problems many directors try to follow instructions from above. Yet it is possible and necessary to make decisions at their own level.

Participants in the meeting have been given information about the results of a questionnaire conducted by the organizational committee among managers of enterprises. In the opinion of the managers themselves, strategic and long-range decisions comprise only 15 percent of the overall number of decisions that are made. According to our investigations, the situation is much worse. Of the 300-400 decisions that are made each year, if one includes only orders from the director, at best one can find two-five orders (and I am not taking into account the plans) that have to do with problems of strategy. The rest of them are repeat decisions either to follow orders from above, or personnel decisions or decisions pertaining to bonuses and reprimands.

It is undoubtedly necessary to reduce the number of management decisions. After flying in from Moscow to Irkutsk, before departing for Khabarovsk I spent the evening in the same hotel room with V. I. Koltovskiy, the general director of the Kamerskoye (Khimvolokno) Production Association. He said to me "I do not like Mondays because after our days off in my mail there are 10-12 instructive documents from the ministry and I must respond to each of them..."

But the buck doesn't stop with the director. He signs approximately 300-400 orders a year, and there are record holders who issue up to a thousand orders a year. It turns out that the director also signs two-three orders a day, and sometimes four. It is difficult for the director, but what about the able, the managers of the shops and services?

There are various indicators for classifying decisions, but the main criterion is to divide them into necessary and unnecessary ones. Unfortunately, many decisions are made which change nothing and only clog up the channels of administration and are essentially impediments. I shall not try to say precisely how many of them there are, but it is a large number, at least no less than a third of the decisions. There is a bureaucratic principle: I have signed a paper and it is as if I have relieved myself of responsibility because I have reacted. I have issued an order and if nothing happens it is not the manager, but the worker who is to blame.

But the weakest stage now is the implementation of the decisions. If one were to rephrase a well-known saying, one could say that good decisions have paved the way to certain of our difficulties today. Good decisions are made, but their execution is at a low level. There was a tendency toward decline of executive discipline. Only in the last 2 or 3 years have there been certain changes.

How does one raise the coefficient of decision implementation? What are the procedures for implementation? The first one is to inform the worker of the decision. It is not always clear. The second one is the implementation. Having received a decision, only one-third of those to whom the decision applies will begin to execute it. Another half wait for additional instructions, and approximately 20 percent think to themselves that the decision is incorrect, they do not agree with it and they do not even intend to carry it out. Therefore informing the worker of the decision is not a formal process. It is necessary to make the worker a proponent of the decision.

It is best to begin with the preparation of decisions. Who prepares them? Two-thirds of them are prepared by the managers themselves and a narrow group of specialists. This is known to undermine the effectiveness of the decisions and their implementation.

Research has shown that half of the directives, instructions and orders received from the branch do not sufficiently take into account the interests and capabilities of the enterprises, and therefore the enterprises do not agree with them. In such a situation there will be no great zeal for implementation. It is necessary to convince the workers that the decision

that has been adopted corresponds to their own interests. And this is accomplished best by allowing them to participate in the preparation of the decision.

The adoption of a strategic decision involves replacing something old with something new. Here we inevitably come against the force of inertia, namely the inertia of personnel. I believe that this has retarded the execution of many decisions. Even decisions for improving management have encountered the inertia of thinking. This was noted at the 22nd and 23rd party congresses and at plenums of the CPSU Central Committee. Manpowering personnel is mandatory when there are structural changes in production.

And, of course, it is necessary to improve control over the implementation of decisions, including at the level of the enterprises. We have many supervisory agencies. Sometimes they are an impediment and cannot help. We create and perceive control as a system which punishes and looks for mistakes. But it would be expedient to establish control as feedback; it warns us of interruptions and does not merely register them. We are faced with the task of establishing this kind of control.

The quality of decisions depends on the quality of management information.

Yu. I. Tychkov, candidate of technical sciences, plant director: In my view improvement of management depends directly on improvement of the supply of information for the manager. It is necessary to become accustomed to regarding information as a regular resource which is used in the management and organization of industrial production. If we allow ourselves the luxury of making decisions without being sufficiently informed, they will inevitably not be the optimal ones and sometimes they will be incorrect.

It is necessary to approach the improvement of management by analogy with the improvement of the management object. I have in mind regulation of management labor and its supply this modern technical means, above all electronic computer equipment. It must be noted that managers are frequently more competent in using the technical equipment and technology of the main production than they are in the technical equipment and technology of processing management information. And to some degree we are reaping the fruits of this since problems of increasing the effectiveness of the utilization of computers and automated control systems at many enterprises are farmed out to specialists of the corresponding subdivisions and services. It is these specialists and not the managers who frequently form the position in the utilization of computer equipment. This, in my opinion, is one of the serious impediments to the improvement of the technology of management activity. Moreover, the manager too frequently becomes dependent on information from his subordinates, and this gives rise to serious psychological and administrative collisions--the possibility and the desire of a number of workers "not to inform" him about some things, or to notify him with some degree of distortion of the facts.

At least in my management activity this kind of dependency for information has caused serious dissatisfaction and alarm. We spent several years creating a

management information system which is used to manage the enterprise. It has been in operation since 1975.

The creation of the UIS was accepted as a necessary step by the first committee of the enterprise. At first there was no problem. The production rate increased and was improved by the fact that we began to report to the managers of our corresponding services copies of the information which appeared on the display screen for me, the head engineer of the production shop. After approximately a year and a half or 2 years the development of the UIS gave the remark to me that I had given indifference to my branch and then I had either ceased paying attention to certain forms or had begun to look at them less frequently. But this happened not because I had given indifference to the information system, but because of other reasons. Certain information is fairly static. For example, the average earnings in the various shops, as a rule, are not subject to sharp changes. Why should I always have to be looking at them? The second reason is that because of the large number of forms, and at first there were 50 of them, I did not manage to utilize any of the information as I would have liked to, that is, to subject it to a certain kind of analytical interpretation. The director does not have time for this and even in principle this is a task for the specialists of the functional services.

A solution was found. A special group was created; we called it the group for analyzing situations (GAS), which included the specialists who were most inclined to analytical activity. At the end of each quarter this group places on my desk the analytical materials which are the result of the analysis of information generated by the UIS. In this information they formulate the tendencies taking form in production and make recommendations. Copies of the information pertaining to various subdivisions are sent to them.

Thanks to the analysis group we discovered certain problems whose existence I had not even suspected. It is generally known that instrument production is one of the biggest bottlenecks. Yet it turned out that we fail to utilize more than 30 percent of our fittings that are manufactured in the instrument shop. Incidentally, a similar conclusion was drawn by the EKO consultation brigade concerning the Pavlodar Tractor Plant.

On the basis of information formulated by the GAS we adopted a decision to improve the utilization of fittings in a fairly definite situation. But the UIS and the GAS provide for definite situations relative to the past and present. And yet each person who makes a decision has also the task of foreseeing the consequences to which its implementation will lead in the future. We turned to methods of imitation modeling and began to create a complex of imitation models. So far it is limited. We learned to "play" with the plan--to see what changes in the economic indicators would be brought about by one change in the products list or another.

Our enterprise has an unstable list of products. Previously we did not always know what change in the products list would be reflected in the profitability, the production cost and so forth. Now, with the help of imitation models, we have obtained the opportunity to predict to a considerable degree the consequences of the decisions that are formed.

It is also necessary to improve organizational structures with respect to other aspects of management. Thus the creation of a comprehensive system for product quality control (KS UKP) has led to serious structural changes. It has been necessary to organize a special division for quality control which has laboratories in each shop and which has taken on the functions of analyzing all deviations in the items that are produced.

Such concepts and systems for improving management require the changeover of a large group of workers and specialists of various ranks to the utilization of information with direct terminal access. In many cases the printouts that are produced periodically or on request cannot essentially change the situation in management. Only when all levels of plant specialists, from the warehouseman to the director, are working with terminals, when information is available to them at any necessary moment, will this equipment be efficiently effective.

[Question] What kinds of incentives are there for the work of the group for analyzing situations? What do you do when your opinion diverges with the opinion of the committee of head specialists?

[Answer] Three people from the group for analyzing situations have been promoted because they displayed analytical capabilities and the inclination for the strategic style of thinking, without which, in my opinion, one cannot be a manager. Orders have been issued concerning material incentives.

Does my opinion diverge from that of the committee of head specialist? It happens that we differ, disputes arise, but I have not yet been in the minority. Not so long ago at a committee meeting we discussed the question of when to begin the creation of flexible production systems. Some wanted to begin it themselves and to organize a specialized design bureau for flexible systems. Others said that it was better not to be in too much of a hurry and to wait for a decision from above--then we would have resources and financing.... Nonetheless the advocates of the first point of view won out, and I was quite satisfied with this. To wait means to get behind, and flexible production systems are one of the main paths to increasing labor productivity, reducing the demand for labor resources and increasing production mobility.

Responsibility Must Be Increased

B. V. Prilepskiy, plant director: Rem Aleksandrovich Belousov quite correctly raises the question of increasing responsibility and executive discipline. Control must be stepped up. I call upon my assistants to check not only on the subdivisions that are behind, but also on those that are doing well. The ones that are doing well can also let you down if you do not pay attention to them.

Increased responsibility is sometimes impeded by excess regulation and limitation of independence. I once calculated that the list of reports required of the enterprises alone amounts to 14 typewritten pages. Even in the councils of directors of the subbranch where, it seems, they should be speaking about general problems of the enterprises and about the future, on-the-spot questions come up more frequently than long-range ones.

Sometimes a routine approach to management also places the enterprises in disadvantageous conditions. I recall from memory the following case. A plant of one department achieved high growth rates, but before this it had been behind for several years in a row and the plan had been adjusted for it. All it had to do was fulfill this reduced plan once and its growth rates almost became the reference point for managers of the subbranch. Enterprises which have been working stably have been increasing their production volumes from year to year and, naturally, have not had the opportunity to make a great jump in their rates. But the all-union production associations require this kind of jump from all enterprises. Thus an uneasy situation was created in which it was impossible to deal with strategy.

V. P. Shapovalov, director of the Plant for Low-Voltage Equipment: I agree with Boris Vasil'yevich Prilepskiy: each production must be approached individually. The correspondence between operational and strategic decisions depends on the specific features of the production and on the age of the enterprise.

In what and when should the director intervene? During the first years of the existence of the enterprise, it seems to me, he should intervene in literally everything. At least for me in the first stage of the plan's operation every trivial thing seemed important. For the way things are established has a lot to do with the way they will proceed subsequently. Gradually operational decisions began to recede into the background. There were fewer problems with which I had to deal myself. I managed to concentrated on analysis and long-range problems.

V. D. Rechin, candidate of economic sciences, Institute of Economics and Organization of Industrial Production (IEiOPP) of the Siberian Branch of the USSR Academy of Sciences, Novosibirsk: Analytical functions must be developed. We have degraded the role of analysis. Frequently a good deal of superfluous administrative information is created, but there is not enough analytical information because the tasks have not been clearly formulated. In higher educational institutions they do not sufficiently train specialists for analysis of information. Take the plant's planning and economics division. It processes information on forms of the Central Statistical Administration, but its workers are frequently not interested in the reasons why this information is processed.

In my opinion, the enterprise is not capable of analyzing everything itself. What is a group for analyzing situations? It is a kind of consultation group under the director. But both for the individual and for the enterprise it is difficult to objectively evaluate oneself, one's own work. It is necessary to have a competent view from outside and frequently also assistance after the results of the analysis and the disclosure of tendencies. It would be expedient for us to create consultation organizations in our country. In Denmark there are 400 independent consulting firms, and in the United States--15,000. Officially we have no consulting organizations but we have made attempts at consulting activity.

I. P. Shkurenko, association general director: It seems to me that Yuriy Igorevich Tychkov is still interested in information. I do not like current information and I try not to use it. It is a very rare case when I turn to information--when there are gross and excessive deviations from the regular course of production, of which we do not have very many. Once a month I hold a conference and figure out the basic problems.

Yu. I. Tychkov: On the basis of what information?

I. P. Shkurenko: That which is given to me by the planning and economics division or the division for labor and wages. We have tried to create a management information system (UIS) on the basis of electronic computers. First of all we asked the managers of the shops what kind of information they need and the division for automated control of production began to issue it. There turned out to be too much information, everyone rebelled, and we rejected the UIS.

Our group for analysis exists informally. When I am dealing with a problem I turn to the people who, in my opinion, can prepare the answer most skillfully. It seems to me personally that this approach is correct.

N. B. Mironosetskiy, doctor of technical sciences, IEiOPP of the Siberian Branch of the USSR Academy of Sciences: But perhaps information is needed not in figures, but in graphs and diagrams which better reflect the dynamics and the tendencies?

I. P. Shkurenko: Yes, I asked for information which can show tendencies. The form in which the information is submitted is an important thing!

B. V. Prilepskiy: At one time I too was skeptical about the group for analyzing situations at Yuriy Igorevich Tychkov's plant. But then I became convinced that such a group is necessary at the plant. It will analyze more objectively the tendencies in the development of production, and I think that structurally it should not depend on the functional subdivisions. Analysis is a school for studying management. It should be learned by every future specialist.

We also use a UIS. I do not think that there are any superfluous flows of information there. The system makes it possible to take that which is necessary at each level of management and quickly reject that which is unnecessary.

P. V. Gorshkov, deputy plant director: The director and I visited Yuriy Igorevich Tychkov. We liked the UIS. We coordinated it with the Sigma automated control system and obtained a fairly good conglomerate.

I. P. Shkurenko: And what concrete information for the UIS do you receive from Sigma?

T. V. Gorshkov: Planning and report data for the month. All the basic indicators can be displayed on the terminal both for the month and since the beginning of the year and since the beginning of the five-year plan. Once can

also see the annual and quarterly plans with a breakdown for the various months, the profitability and the profit. The second area of information has to do with the items and the course of production. It includes all items, the plan for the day, the plan since the beginning of the month, and deviations. It also includes information about the utilization of materials, wages in the various shops during the month, and overexpenditure of the wage fund. We can also control the delivery of prepared products. The third area has to do with personnel: turnover in the plant, in the various shops and in the various occupations, depending on work tenure.

N. B. Mironosetskiy: The skepticism that can be observed here with respect to the actual industrial utilization of automated control systems and the so-called management information systems is justified. It is no accident that industrial workers note the "poor reputation" of many ASU's.

Among the reasons for this one can give the poor effectiveness of the programs; the isolation of the various tasks that are to be carried out in the ASU; the insufficiently active normative base; and the large labor expenditures in the preparation of information.

A number of management systems that have been created have been disappointing not only to the users, but also to the developers of the systems. One could tell that there was a lack of prepared specialists, a well-developed theory of the ASU, a "hindsight" approach, and so forth.

But among the less effective systems there are also a number of ASU's that are constructed on a fundamental scientific basis and are operating effectively. As a rule, they are based on a system approach and have a developed mechanism of adaptation. The Sigma ASU has already been mentioned here.

What is valuable in the Sigma ASU; created in it is an information base which reflects the condition of production in each particular stage of time. Everyone knows how important it is to be able to promptly reveal information about the condition and deviations during the course of the production process and to make decisions on the basis of this.

It is very important to emphasize the principles of the creation of the information base for the Sigma ASU. All workers involved in one production act or another participate in the creation of current information concerning the dynamic production process--the worker, the foreman, the controller and the warehouseman. Any mistake inevitably affects somebody's interests and this serves as a very reliable guarantee of the correctness of information that is fed into the computer.

Information is fed in according to deviations. For instance, in the report on absences instead of including all workers' time cards for the various shifts, they feed in only the time cards of those who did not show up.

The reliability of the information is verified each day even by the fact that they compare the printouts for the wages of the brigade and section during the shift. In the first place it is immediately clear who has worked in what way and how much they have earned and, moreover, one also finds here the rare

mistakes which in any case arise in the information base and also the shortcomings of the enterprise's information base.

A very important quality of the Sigma system is that it is introduced gradually. Let us say that the complex entitled "Production" has been introduced in one shop. The other shops train here. When this complex has been introduced in all the shops one can create an integrated plant system "production" and move on to the introduction of other complexes that are based on the "production" system.

The Sigma has a special complex called "adaptation" which enables it to use some standard variants to form a system that is individualized not only for each enterprise, but also for the present level of its technical and organizational development. The adaptability and openness of the system as well as the possibility of the development and introduction of various kinds of changes, right down to the introduction of new complexes, are extremely convenient.

An association of Sigma users have been organized. Members of the association participate in coordinated development and improvement of the system. In connection with the needs that arise. Thus the system is constantly in movement and is raising and solving crucial problems. The Sigma ASU already includes a system for automated planning (SAPR). The preparation of an item from the idea to the production takes place using a special complex. This is being realized, in particular, at the Rubtsovsk Plant for Electrical Tractor Equipment and at many other enterprises. The next stage in development is minicomputers and personal computers which bring the ASU even closer to the manager.

B. V. Prilepskiy: The adaptability of the Sigma ASU is obvious. Our enterprise has continuous production. We have less operational information, but it is important for us to improve the continuous technological process. Therefore we have taken the path of integrating the Sigma with the automated system for controlling technological processes (ASUTP). We use microprocessor equipment for the ASUTP. There is no analogue for the integration of such systems either in our country or abroad. At the same time it is impossible to reproduce it because of the lack of the proper instruments. The Ministry of Instrument Making Automation Equipment and Control Systems does not produce and is not assimilating instruments for monitoring technological processes. And there is a need to produce them on a large scale. This was demonstrated by the conference which we conducted. Workers in medicine, the food industry and other branches with continuous production were interested in the system.

Considering Each Large Decision From the Standpoint of Intensification of Production

A. G. Aganbegyan, academician, director of the IEiOPP of the Siberian Branch of the USSR Academy of Sciences, Novosibirsk: And so let us sum up the results. We have expressed many interesting judgments and suggestions regarding increasing the effectiveness of management decisions. Each large management decision that is made at the enterprises and in the associations should be considered from the standpoint of intensification of production.

What concept of development should they work on and use as a reference point for intensive factors? What should the director do from this standpoint?

It is our opinion that in the next 5 years it will be necessary to increase the utilization of organizational-economic and social factors in development. There are large reserves here. At the same time it is necessary to devote more attention to technical progress and to prepare conditions for a radical technical reequipment of the branches and a changeover to principally new technological systems which are based on systems of machines and technical equipment of a new generation, in other words, for a changeover to a revolutionary technologies. So far the technological process has been developing mainly along the evolutionary path--through improvement of already existing technical equipment and technologies, which provides for increasing labor productivity only by percentage points. The changeover to principally new technological systems will lead to radical changes in the increased effectiveness of production. It can produce a severalfold acceleration of the growth rates of labor productivity.

The utilization of organizational and economic factors proceeds in two directions. The first includes measures for improving the system of planning, management and the economic mechanism. The second is the development of measures of technical progress which is related to restructuring management. This involves computerization and improvement of the utilization of the electronic computer equipment for purposes of management as well as the creation of automated control systems.

We should like to draw attention to how a plant is actually managed without the ASU. There are various services functioning in public health and each shop wants to have its own representative and its own channel for information. The bookkeeping office wants to have a bookkeeper in the shop, the planning division wants a planning and distribution bureau, the labor division wants a norm-setter, and so forth.

At one time an analysis was conducted of the situation at the Barnaul Radio Plant before the introduction of the Sigma ASU. There were 86 reports and forms that were filled out in the plant which either duplicated one another to a considerable degree or provided contradictory information about the same events. Now there is only one channel for reporting information to the computer center and many divisions receive it from there. In this connection, if one is to be consistent, it is necessary to eliminate all the services in the shops, and it is possible to consolidate shops and sections if the technology allows this. Then the application of the ASU can lead to essential organizational changes. Many enterprises do not have enough of this kind of consistency. And this is also the reason for the poor effectiveness of the automated systems.

The system provides information for management and facilitates the adoption of a management decision. If it is not just three managers who have terminals, as at the Barnaul Machine Tool-Building Plant, but they are present in the planning division and all services, then all information can be received by pressing a button and bringing it up on the terminal or reproducing copies and printing it. But to do this it is necessary to have computers whose design

makes it possible to operate with terminals, it is necessary to be able to join them to existing computers and to have additional transfer devices between the terminals and so forth.

The production of computer equipment is clearly lagging behind the need for it. Thus the technical means are holding back the possibilities of utilizing ASU's and UIS's for improving management. Many computers of a high class are now appearing. It is necessary to assimilate their production more rapidly.

Decisions concerning the strategy of development, in our opinion, should comprise the basic content of the labor of the top manager. At the ZIL the general director handles problems related to the creation of new models of motor vehicles, technical reequipment, and capital construction. The general director of the Ivanovo Machine Tool-Building Association himself manages the policy for the creation of flexible automated productions for metal processing.

I happened to have a chance to visit an electronics firm near New York. I asked the director about the capital and the output. While answering he glanced in his notebook and then said: "None of that is important; the main thing is strategy. If we rely on producing technical equipment that is the wrong kind, we will go broke."

I should like to draw the attention of the directors to strategic activity. Unfortunately, many people devote more time to current affairs--to the shortage of material and labor resources, checking on the operational course of production. In this case, naturally, long-range activity recedes into the background.

Expansion of the rights of the enterprises and the large-scale experiment that is being conducted also affects the level of management. There are greater opportunities for managers to display initiative and select the correct strategy for development, and the cost of each decision they make is increasing.

Colleagues Give Advice

After the discussion participants in the Directors' Club were given the opportunity to prepare a strategic management decision. And the proposed situation was not an artificial training situation; it actually existed at the Divnogorsk Plant for Low-Voltage Equipment. The situation is typical for many enterprises: they are always planning an increase in production volumes for the plant while considerably expanding the list of products that are produced.

When there is an expansion of the list of products with practically the same capacities there objectively arise preconditions for deterioration of the technical and economic indicators. At the same time they approve plans which envision both an expansion of the products list and an increase in production volumes and improvement of technical and economic indicators in comparison to the level that has already been achieved.

It is not easy to find a way out of such contradictory situations, but it is necessary. Perhaps in Divnogorsk it is more difficult to solve this problem than it ordinarily is since the enterprise was constructed as a narrowly specialized one, intended for the output of only three kinds of items. It was intended that this would be a series production plant which reproduces developments of the head all-union scientific research institute in the subbranch, when VNIIElektroapparat, which is located almost 5,000 kilometers away in Kharkov. It was planned for them to obtain a number of parts and blanks through cooperation with other enterprises of the Ministry of the Electrical Equipment Industry. Hence the technology is already oriented toward mass and large-series production, including special equipment intended for particular parts and operations which could not be utilized for producing new kinds of products. After the products list is changed this equipment becomes unnecessary, but it is difficult to sell it--it cannot be utilized at other plants.

The enterprise went into operation in 1973 and even by 1975 it was planned for it to produce four items, in 1980--seven items, in 1983--12, and in 1984--15 items, that is, a fivefold increase in the products list as compared to the one that was planned. There was also rapid growth of the number of type sizes: in 1980--636, and in 1984--about 1,500!

Expansion of the list of products complicates the list of products complicates the preparation of production and leads to additional purchases of new materials and batching items. New jobs appear related to reinstallation and readjustment of equipment. Specialists and laborers are constantly being taken away from solving problems related to the actual production in order to prepare for the new production. At the same time the number of industrial production personnel does not increase, and in Divnogorsk it is difficult to increase it because of the lack of labor force in the young new city. The slow construction of housing makes it impossible to attract labor force from other cities and regions.

The plant has done a fairly good job of handling the difficulties that have arisen and has achieved good indicators, which is shown by the figures in the table. The plan's director, Viktor Prokof'yevich Shapovalov, discussed the plan's work and the participants in the Directors' Club were convinced for themselves when they visited the shops of how many important organizational and technical measures had been taken to achieve this. As a result of the introduction of progressive technologies--the changeover to cold pressing of parts instead of mechanical processing, to precision casting and other perfected technological processes--labor productivity decreased.

"You have seen on the conveyor the production of distributor points (RP). The item has five sizes and each size has 750 diagrams. But it is not with these that we have the great difficulties, but with the installed automated equipment which has thousands of type fittings," said V. P. Shapovalov. "We have taken various paths for the fulfillment of the plan for the products list. In the assembly shops the output of products is planned using computer equipment. The computer issues printouts (we call them 'labels') which indicate the complete description of the item and the number of the delivery agreement. When it goes on to the conveyor the installed automated equipment

should be the same as is indicated on the label that accompanies it. When it comes out different there is no payment for its manufacture. Previously each month we manufactured several thousand automated machines which were not needed for deliveries during that calendar period, but now we have reduced unplanned production to zero. We produce only what has been ordered under agreements. True, we still have a large volume of incomplete production, and it is also not in sets, amounting to a total of 500,000 rubles' worth.

"But still we do not achieve 100 percent fulfillment of deliveries, mainly because of the adjustable automated machines. They are ordered by about 4,000 consumers. We have great difficulties with batching and dispatch. Frequently the same products which we produce from the 25th through the 30th of each month do not go into the sales plan since the railroad loads the cars according to their destination. And until the car is completely full, we do not receive a receipt. As a result, products that have been manufactured and turned over to the railroad may not be included in the plan for the month that is coming to an end.

"We have even greater difficulties with the procurement production than we do with the output shops. The increased number of kinds of items is manifested in the operation of unique equipment, say, presses, in considerable losses of machine time: almost 70 percent of it goes for readjustment.

"Because of the frequent adjustment of the equipment and the utilization of a large number of various press forms, stamps and adapters, it was necessary to create our own instrument production, which was not envisioned in the plan for the plant.

"At the plant they devote a great deal of attention to collective forms of labor organizations. Brigades include 82 percent of the workers, which contributes to increasing labor productivity.

"The design division is operating under great stress. In order to keep up with the fulfillment of the increased volumes of work because of the expansion of the list of items, we have introduced for the designers a system of norm-setting of assignments and new forms of material incentives. The effectiveness of their labor has increased. But even this has turned out to be inadequate. It is necessary to turn to overtime."

The reserves that were at hand have been basically exhausted. In order to move forward we need new solutions. What are they?

Here is how they are seen at the plant.

The first area, which can be realized through the efforts of the enterprise:

unification of the type usage of produced items (although the possibilities here are limited because of the design and technological differences in the products);

the introduction of progressive technological processes, equipment and new material;

consolidation of the output of batches of parts;

limitation of the number of kinds of an item produced in a single period in order to increase the series output (1 month--one item, another month--others). But this approach has limitations because of the requirements of the consumers for uniformity in delivery;

restructuring of production from the purely technological principle to the object-closed principle, through which, under the conditions of production of many kinds of products one can provide for more efficient management, and operational calendar planning and accounting are simplified.

Table--Dynamics of Indicators of Divnogorsk Plant for Low-Voltage Equipment

Indicators	According to Plan	1975	1980	1982	1983	1984	1984 in % of 1985
Labor productivity, %	100	32.5	99.5	101.6	102.4	108.5	122.8
Profit, %	100	planned	92.0	136.0	169.4	210.0	228.0
Number of kinds of items produced	3	4	7	8	12	15	--
Additionally, consumer goods	--	1	5	7	7	8	--
Number of ways of producing items	--	--	636	959	1105	1392	218
Proportional labor-intensiveness per 1 ruble							
NChP Norm/hour							
ruble	--	--	0.202	0.203	0.210	0.226	--
Including new items	--	--	0.260	0.335	0.232	0.302	--

The secondary--solution to problems with the help of higher levels;

final orientation of the plant toward a particular profile of products;

the development of cooperation with other plants;

more intensive housing construction and the enlistment of specialists from related enterprises.

What do participants in the Directors' Club suggest?

Yu. I. Tychkov: I should like to stipulate that I cannot lay claim to any profound conclusions because I have not known the plant for very long. But still, in my opinion, a certain amount of advantage in mass- and large-series production can be obtained if one makes decisions that take into account the design-technological peculiarities of the items. In the first place, this is possible through searching for principally new solutions relative to the functions of the instruments, for example, from when changing over from

contact to noncontact instruments. In the second place, through careful design and technological preparation for the production of the items.

Both of these areas under the conditions of the plant whose problems we are discussing are still difficult to realize since it does not hold all of the cards. It is very difficult to coordinate all of the changes with the developers, who are located in Kharkov. Therefore the first strategic task, in my opinion, is to organize at the plant a good specialized or special design bureau. Then there will be real prospects for design-technological improvement of the items.

It seems to me that one could obtain a great advantage if one were to organize as part of such a bureau a subdivision which would deal with functional cost analysis (FSA). It would investigate all groups of items and suggest measures for improving them. First of all it is necessary to consider the degree of unification and normalization of the products. If this were increased there would be a reduction of the time for design-technological preparation of production and the utilization of capacities would improve since there would be larger batches of blanks and fewer readjustments of the equipment. In general it would be necessary to investigate especially the nature of the shortage of capacities in the production of blanks: either this means a shortage of workers and, as a result, the coefficient of shift work is inadequate for the utilization of equipment, or it is necessary to change the structure of the equipment, improve operational planning of production, and consolidate batches of blanks on the basis of unification and standardization of components, parts and the items as a whole.

On the basis of our own experience I wish to say that it is expedient to divide the functions of the technologists into providing for current production and developing future technology. There should be technological laboratories that are exempt from service for current production. Concentration on the future is justified. If there are people who are bogged down in current production they cannot deal with the future.

I. P. Shkurenko: I fully agree with the preceding statement concerning having one's own design bureau. I can't imagine an enterprise without one. It is difficult to work when there is no possibility of selecting one's own technical policy and it is imposed by the scientific research institute and design bureau which are thousands of kilometers away.

Viktor Prokof'yevich discussed the great "imperfection." If assignments were formulated for the brigades in the form of brigade sets, under the conditions of series and mass production there is a possibility of no longer producing items that are not insets.

Understandably, it is easier to give advice than to follow it, but in such a flow-line production as yours robotization could eliminate many problems. It would be very effective for stamping plastic items. We have set for ourselves the task of eliminating the profession of stamps machine operators in the production of consumer goods by using robot equipment within the current calendar year.

And, of course, it is necessary to draw attention to external actions. I think that the problem of coordinating the way that the products are made should be the responsibility of the plant director. I am far from convinced that it is necessary to have such a colossal number of types of execution. There is almost no doubt that this number could be reduced.

V. K. Gupalov, plant director: It is necessary to complete the development of the system of operational calendar planning and to have a full reserve of incomplete production at the level of the normative. To do this it is necessary to calculate the optimum amounts of supplies and to revise the operational production schedule for the shop.

Our plant produces Biryusa refrigerators at a rate of three per minute. We have adjusted the system for startup and production, calculated what the supplies should be and we are strictly keeping to our calculations in order not to allow the conveyor to be halted.

Now about the equipment for production. I spent 2 days visiting the instrument shop. It is a wonderful shop and there is a lot that is interesting there. But nonetheless one is immediately aware that it is individual piece production. There is no classification of devices or fittings and there is no standardization either. In my opinion, the head technologist's division should be instructed to classify the instruments, stamps, press forms, fittings and then standardize them as much as possible.

How does one get around the difficulties with the dispatching of products? It makes sense to construct a branch of the container area on the plant railroad sidings. At least this is what we did. We gave our own staff unit of a warehouseman to the railroad. Now we dispatch all the products directly from the container area of the plant, which is a branch of the cargo railroad station, and we receive receipts.

V. G. Zav'yalov, general director of the association: I wish to draw attention to the social issues. It seems to me that turnover in the assembly shops is largely related to the artificial lighting. In spite of the good equipment the plastics shop also produces a bad impression. It is a mass of repetitive, monotonous operations. Robotization is necessary in this shop.

Yu. G. Shelyukhin, candidate of technical sciences: At the plant there is a shop for automation of production and, consequently, there should be people who are capable of making decisions regarding automation and mechanization. For some reason it is thought that flexible automated production--GAP--necessarily involves machine tools and robot manipulators. We are taking a different approach. GAP's can be created in assembly sections. In 1979 at one enterprise I saw on the conveyor equipment for welding receiver-amplifier bulbs. The equipment is fine and the parts have rigid tolerances, and assembling them is a serious matter. Nonetheless the assembly is done on an automated machine. Your line reminded me of that one. It is necessary to get rid of the conveyor in the form in which you have it operating. It is not surprising that people leave. The work is very uninteresting.

Please excuse me for being so direct: not to fulfill the delivery plan when the enterprise is participating in the experiment is a sad thing. There is the possibility of negotiating with the consumers and suppliers of the materials! It is necessary to set new tasks for the consumer service as well. It seems to me that the work under the new conditions should begin here.

I. N. Gubaydullin, plant director: Yes, it is necessary to work with the consumers. But one should not impose upon them conditions that are convenient for the supplier and unacceptable to them. And, judging from the press, this tendency can be found among enterprises that are participating in the experiment. I would not like for our Divnogorsk comrades to take this path.

V. T. Boltivets, general director of the production association: At the plant it is necessary to improve the contingent of foremen. The majority of them have a secondary technical education. From such people one cannot produce shop chiefs, not to mention higher-level managers. It is necessary to reinforce line personnel: to introduce classification for masters with the corresponding diplomas, and bonuses for sections and shifts for the direct results of their activity. The wages of the foremen will also increase--it will be possible to enlist young specialists with higher education who have prospects for further advancement.

[Question] And what are the wages of your foremen at the association?

V. T. Boltivets: Our shop chiefs frequently receive less than the foremen. Not much less, but less.

[Question] What point do you see in increasing wages?

V. T. Boltivets: That it will make it possible to retain the foremen. It is not possible to organize any production if the turnover of the foremen is higher than 30 percent. And this is the case here.

A. G. Aganbegyan: In my view useful solutions are being suggested for the development of the design and technological services, improvement of operational planning and management, unification and standardization, and increased contacts with the railroad. I would like to additionally raise a number of issues, primarily social ones, taking into account the aggravation of the situation with respect to labor resources, in the country, especially in this young Siberian city, taking into account the fact that at the plant the list of items is expanding and becoming more complicated. If special measures are not taken difficulties can arise, the more so since the enterprise is proceeding forward at rapid rates.

It is necessary to give special consideration to the conveyor. Unfortunately we do not have any organizations to which we can turn regarding reorganization of the conveyor. We have to take care of this ourselves. It is worth paying attention to what Yuriy Grigor'yevich Shelyukhin said about automation of assembly work. The conveyor for the small items produced by this plant can be mechanized and automated to a considerable degree. For this is not the production of an automobile or tractor. Moreover, people quickly decide they do not like to do this kind of work. At ZIL on the main conveyor there are

many temporary people from those organizations which are to receive the motor vehicles, although an immense amount of attention is devoted to the conveyor there. A special shop manufactures conveyor equipment, and instruments and devices are created which will provide for reliability of the operations. Some problems cannot be solved by desire alone.

It would be expedient for the Divnogorsk Plant to develop services which would engage especially in mechanization and automation. One can obtain a great advantage in labor productivity from this. Let me stipulate at the outset that my acquaintance was fairly superficial but still it seems that in a place where the volumes of items are measured in millions of pieces and are continuing to increase one could apply for automation of production robot container lines of the design of the Lenin and State Prize winner Lev Nikolayevich Koshkin. It is necessary to show him the plant's items. Knowing Koshkin's developments I imagine that this production would be suitable for changing over to robot conveyor lines, especially plastic casting and stamping. In similar sections lines using Koskhin's designs are used at the Riga Aerosol Plant and the Podolsk Battery Plant.

It seems to me that one should try through intraministry cooperation to transfer some of the parts to other plants, and the manufacture of some of them should take place outside the territory of the enterprise even if it is through creating branches and divisions of the head plant or Sputnik enterprises. Such possibilities exist in Krasnoyarsk Kray.

The experience in conveyor production in the sewing and knitwear industry as well as other branches shows that through social factors alone it is possible to sharply increase productivity. The experience of the Tirospol Sewing Factory imeni 40-Letiye VLKSM is interesting.

And, of course, the waiting list for improved housing is alarming--more than 20 percent of the workers. A considerable proportion of those who are waiting are living in dormitories. With this number of people in need of housing the volume of housing construction is still very small.

As I understood it, the average age of the workers at the plant is 26. It seems to me that there is some point in creating a youth housing cooperative (MZhK) following the example of Sverdlovsk or the city of Kaliningrad near Moscow.¹ The conditions for this kind of construction are excellent in Divnogorsk. Having worked in the MZhK the people will not leave, since the city is somewhat distant from other population areas and the plant is the only large industrial enterprise. The plant specialists will not go to the GES because it needs quite different occupations. The plant can grow and produce a good impression. How it is constructed, how there is order everywhere! These, of course, are reliable secondary measures and behind them there should be excellent work. But the reserves are already exhausted. Essential measures are needed.

The problems of maintaining production rates and good technical and economic indicators when expanding the list of products is one that must be solved by many enterprises. What else can the readers suggest? We await your letters and statements about your methods of solving similar problems!

FOOTNOTE

1. For more detail about this see EKO No 1 for 1985.

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CSO: 1820/169

RESULTS OF DECISION-MAKING QUESTIONNAIRE REVEALED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 32-35

[Article by V. F. Komarov, candidate of economic sciences, and V. D. Rechin, candidate of economic sciences, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "From the Standpoint of the Director"]

[Text] The organizing committee of the club of directors distributed to managers of enterprises a questionnaire devoted to the adoption of management decisions. The organizing committee received 28 completely filled-out questionnaires. All those who filled out the questionnaire can be divided into three groups. The first group includes directors who think that at their enterprises they have achieved effective forms of preparing, adopting and implementing management decisions and do not need additional streamlining of the methods or procedures. For example, they think that at their enterprise they have found the optimal relationship between decisions made unilaterally by the director and the decisions which he makes with the participation of the collective of specialists.

A second group of directors voted for a radical reorganization of the procedures and methods for preparing, adopting and implementing management decisions. They think that at the level of the top manager, for various reasons, we do not engage sufficiently in strategic problems and spend a lot of time on tasks whose solution can in principle be programmed, and that we live with "reactive" rather than "anticipatory" management conditions. One must say that this viewpoint was reflected in the average figures (see Table 1).

The third group of directors answered certain questions on the questionnaire in the same way as the first group did, and others they answered as the second group of directors did.

The figures in the table depict the recognition by the managers of the need to increase the proportion of long-range, creative decisions which are directed toward the development of production. But the quantitative changes in the answers turned out to be less than could have been expected.

Table 1--Classification of Problems and Tasks for Which
Administrative Decisions Are Made

<u>Types of Problems and Tasks</u>		Proportion of Decisions Made During Year, %	
		<u>As Is Now the Case</u>	<u>As It Should Be</u>
Planning horizon of decision	Strategic or long-range (3-5-10 years)	19	25
	Tactical or current (quarter-year-2 years)	32	45
	Operational or dispatcher (day-week-month)	49	30
Repetitiveness of decisions	Standard, regularly repeating, programmed	58	46
	Original, one-time, creative	42	54
Degree of new- ness of problem	Directed toward improving existing activity	73	60
	Directed toward developing new activity	27	40
Sources of solution	Consciously earmarked by manager as anticipation of future difficulties	49	76
	Tasks which must be carried out in reaction to difficult situation that has arisen	51	24

There are remarkable differences in the technology for the preparation and adoption of decisions that is applied at various enterprises, which is clear from Table 2. If in the regulation of management technology the situation is good at many enterprises (23 of the answers indicated the existence of plant standards for the preparation and adoption of decisions), the proportion of the analytical stages of preparation for decisions, in the opinion of the directors, could have been increased.

The figures in Table 3 show that on an average the directors wanted to increase the collectivity of management and to make the procedure of preparing for decisions more democratic. The concrete forms of the manifestation of this general tendency can be seen from the figures contained in the table.

In conclusion let us note that the "average" director has been promoted from the head engineers of the plant (19 out of the 28 responses) mainly after 7 years of work in this position. In the post of director he works for an average of about 12 years and by now he is approximately 55 years old. Every third director of those who filled out the questionnaire is a candidate of sciences. Half of the directors agree that there is an optimal time period for work in this post and that this time period is equal to an average of 12

years; the other half thinks that it is inexpedient to limit the time of working in the position of the director. All directors participate actively in the training-educational and propaganda work: they give lectures, hold various classes and regularly speak before the public.

Table 2--Technology for Preparation and Adoption of Decisions

<u>Stages of Preparation and Adoption of Decision</u>		Proportion of Responses About How Frequently Stages Are Used, %		
		<u>Always</u>	<u>Often</u>	<u>Rarely or Never</u>
Study of situation-- conditions and factors for achieving goals	a) long-range interests of national economy	56	26	18
	b) interests of higher agencies	29	57	14
	c) long-range interests of enterprise	64	32	4
	d) current interests of enterprise	56	33	11
	e) consequences for oneself personally	5	12	83
Formulation of task	a) refinement of goals of decision	73	27	--
	b) establishment of limitations	41	26	33
	c) selection of criteria	25	54	21
Generation of variants of resolution of task or alternative achievement of goal		48	43	9
Prediction of consequences of variants and their evaluation		50	31	19
Selection of variant of decision	a) selection of most suitable variant	64	29	7
	b) conducting a model or other experiment or expert evaluation	--	15	85
Realization of variants of decision	a) formulation of directive document	32	61	7
	b) organization of its implementation	43	46	11
	c) control over its implementation	61	36	3
	d) analysis of results	18	54	28

Table 3--Organizational Forms of Preparation of Decisions

<u>Who Prepares the Decision</u>	Proportion of Decisions Prepared During Year, %	
	<u>Existing Practice</u>	<u>What Should Be</u>
The manager himself and two-three assistants	34	14
Staff subdivisions of the enterprise	39	28
Special subdivision for management (group for analyzing situations, management division, etc.)	9	27
Commission or group created for the given task	12	15
With the help of outside consultants who		
a) prepare a draft of the decision	1	4
b) compile the method, model or program	3	6
c) consult during the process of preparing the decision	2	6

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PROGRESS AT YAMBURG GAS CONDENSATE DEPOSIT RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 36-44

[Interview with Yu. I. Topchev, head engineer of the Tyumengazprom VPO: "First Steps Along the 67th Parallel"]

[Text] Three years have passed since the time in the polar area, at Yamburg, where the largest gas condensate was discovered, where the pioneer landing party embarked and began to assimilate the area. Now the word "Yamburg" has already become a "permanent resident" in the central press and information from there is received almost like news from the front. The significance of this promising deposit for the country's entire national economy is shown by the decree of the CPSU Central Committee and the USSR Council of Ministers which was devoted to Yamburg,² which earmarks measures for the most rapid possible assimilation of it.

There is now a kind of transition period in Yamburg: the pioneer stage of assimilation is coming to an end and they are beginning to prepare for working the deposit. There are now more than a thousand people living and working in this area to which access is still difficult, and dozens of organizations are participating in the construction work for the deposit. Have they managed to do a great deal during these three years or not? What does the experience of one of the northernmost deposits in the country teach us? You will learn this from the materials presented below.

[Question] Before beginning the discussion it would be worthwhile to remind the readers of the natural conditions at one of the northernmost deposits in the country. The winter is hard and long, and the summer is short. The absolute temperature minimum is -60 degrees, and the maximum--+35 degrees. There are sharp and unexpected drops in the temperature and penetrating winds. The conditions are indeed extreme. And partially because of this in the first stage of the assimilation there appeared many unique, purely Yamburgian problems, and nonstandard technical and technological decisions were required.

To what extent were the size and specificity of the problems arising here embodied in the plans for the facilities at Yamburg? How are the latest technical achievements being realized here?

[Answer] Yes, the problems at Yamburg are complicated and they are new for many of us. And the experience we accumulated when building up the Medvezh'ye and Urengoy deposits cannot be fully applied when assimilating Yamburg. Its conditions are more severe and it is located farther from the industrial centers and large transportation mainlines. But difficulties always stimulate scientific and technical progress. And the solutions that are being found during the assimilation of Yamburg once again proved this truth, for they show progress in the development of the gas industry. One might say that in moving from deposit to deposit, advancing farther and farther to the north, to more and more severe zones of Tyumen Oblast, step by step we are improving the technical program, the tactics and the strategy for the comprehensive assimilation of the region.

Although the plan for the assimilation of Yamburg, in our opinion, is fairly progressive in design, it has managed to become somewhat outdated before being embodied. For the existing policy for the development and approval of plans does not allow on-the-spot adoption and utilization of bold solutions since this entire process lasts for years. We shall strive to realize the main economic principles that are embodied in the plan: to reduce labor expenditures at construction sites and to reduce the number of service personnel when working the deposit. But during the process of assimilating the deposit it will be necessary to improve the technical decisions that have been made.

Apparently we shall construct only the first installations for comprehensive preparation of gas (UKPG) in keeping with the already developed blueprints, and new blueprints are being developed for construction of the rest of them.

The main "pivotal point" of our technical policy in northern deposits today is the utilization of large plant manufactured blocks. We began to use the block method to build up the petroleum industries and the gas workers tested it at Urengoy. At Yamburg UKPG's will be constructed from blocks weighing up to 300 tons, and it is possible to use 1,000-ton and even heavier blocks. The advantages of the block method are known: the labor-intensiveness of the work decreases when assembling structures at the construction site. But there are also inconveniences, especially with transportation. It turns out that the more distant the northern regions in which the deposits are being assimilated the more economical the block method of construction is there, but it is also increasingly difficult to deliver the blocks there. On water they can be fairly easily transported on pontoons (true, on the way there are about 15 bridges and therefore the blocks must correspond to their height). But how does one deliver them from the Ob' Bay, over dry land for a distance of up to 90 kilometers?

And yet in principle a technical solution has already been found--mechanisms transported on an air cushion. But the interesting solution, if one may express it this way, "sat around too long in blueprint form." The reason is the same one that impedes the introduction of all new transportation

equipment: it does not have a single master among the machine-building ministries, and the ministries interested in its introduction do not have the appropriate production base. The Sibkomplektmontazh Experimental Construction and Installation Association has now taken over responsibility for planning and manufacturing such mechanisms especially for Yamburg. It will also begin to deliver superblocks for the deposit. We will be hoping that the large platforms on air cushions will be able to deliver the first superblocks to Yamburg.

The block method is promising although it will still go through many transformations. In the future the sizes and weights of the blocks will obviously fluctuate, but the metal-intensiveness of the technological equipment should continuously decrease, while maintaining and even increasing the unit capacity of the equipment. Thus transportation will also be facilitated.

The unit capacity of each installation at Yamburg will be considerably increased as compared to the Urengoy installations. At Yamburg we plan to begin to enlarge the groups of wells. At Medvezh'ye and Urengoy there were no more than five wells in a group. And here, by using incline drilling, we shall increase this number to eight-nine. The assimilated area of the deposit will increase, the concentration of technical equipment will increase, and expenditures on the assimilation will decrease.

We are devoting a great deal of attention to automation at the deposit. Today the same kind of target task is being developed at Urengoy. For Yamburg we have in mind a larger and more comprehensive program. All of the main technological processes during operation will be automated. This will make it possible to take advantage more extensively of the possibilities of dispatcher management and to reduce service personnel to a minimum. We think that by the end of the 12th Five-Year Plan at Yamburg there will no longer be any people on watch, and there will be no need for permanent supervision at the installations. Only periodic control and repair service will be necessary.

We intend to reduce the number of service personnel and labor expenditures with the help of other technical decisions as well. Thus now according to the plan we are to construct a boiler for each UKPG (that is, the traditional decision for the North was adopted). But this requires a complicated water supply and industrial sewage system, a good deal of electric energy will be needed and this will require the corresponding service personnel. All this can be simplified if one uses for heating stoves which operate on gas. This equipment is already being created in conjunction with the Ministry of Chemical Machine Building.

Many other measures are also directed toward acceleration and intensification of the assimilation of the deposit with the least possible expenditures. There is also another goal: to retain the natural balance and to reduce the negative influence of the consequences of scientific and technical progress on the surrounding biological environment.

In the assimilation of the northern regions we industrial workers appreciate more and more deeply how critical the ecological problems are. Here the life

of nature seems especially fragile and vulnerable; it is very easy to destroy it and difficult to restore it. One can even say that as we advance to the north the very concept of assimilation is changing. Today it is formulated as follows: problems of intensification and technical policy cannot be severed from tasks of protection of nature.

[Question] What measures will make it possible to join together the tasks of the technical policy and the problems of preserving the region's ecological balance? Will it always be possible to solve them in an interconnected way? Will the pressure of ecological problems not bring about the corresponding changes in the strategy for assimilating the region?

[Answer] The experience accumulated in Medvezh'ye and Urengoy and the mistakes made at these deposits show the need for a serious revisions of the principles for assimilating the region and make it necessary to search actively for new technical decisions.

For a long time now not only scientists, but also gas workers have been saying that the assimilation must begin with the roads, that they must be constructed before the main detachments of builders come to the deposit. For even automotive transportation can cause a lot of harm to the tundra. All that is necessary is for a jeep to pass over one place two or three times and a marsh forms there and lichen will not grow. And disturbance of the vegetative cover of the tundra and warming of the eternal frost entail serious uninvestigated consequences. Scientists will have to search for means of "repairing the tundra" (this research is already being done in the northern part of Tyumen Oblast by the Institute of Geocryology of the Siberian Branch of the USSR Academy of Sciences). Without a reliable transportation system it will be impossible to accelerate the assimilation of the deposit as well. But so far the only way of delivering the many tons of cargo to Yamburg is by water. But navigation alone will not satisfy the needs of the northern deposit.

At Medvezh'ye and Urengoy the roads certainly did not appear in the first stage of assimilation. For about 3 years they debated the question of whether or not it was necessary to have a railroad to Yamburg. The opponents from the Gosplan asserted that it would turn out to be too uneconomical. But then the questions of operating the railroad were considered separately from its purpose, from the tasks of assimilating the deposit and subsequently working it.

It was suggested that a nonfabric synthetic bed, which has proved its reliability on the routes to the oilfields, be "strewn" under the roads and sidings which are located on eternally frozen ground. To do this the Ministry of the Chemical Industry will have to increase the production of the material for the beds.

Taking into account the aggravation of the ecological problems, the program for working the deposits and extracting and transporting the gas is being adjusted. The gas is transported uncooled from Medvezh'ye. In the northern part of Urengoy where there is eternal frost we cool the gas to the temperature of the ground, and there will also be a system for cooling it in

operation in Yamburg. Incidentally, because of this the reliability and the handling capacity of the pipelines also increase.

Not only an economic effect, but also a large ecological effect can be produced by measures for reducing the assimilated area of the deposit which were discussed above.

Summing up, one can say that we are trying to join together and solve comprehensively the tasks of the technical policy and the preservation of the biological balance in the region. But we do not always succeed in doing this because the production associations are practically the only ones in the branch that deal with ecological problems, and the branch institutes are also involved in this to some degree. For 5 years in the Tyumengazprom VPO there has been a division for environmental protection which exercises goal-oriented control over the ecological content of the planning decisions and their implementation. But dozens of organizations participate in the building up of the deposit. Therefore sometimes randomly, outside the area intended for buildup here there appear all kinds of new structures and certain planning decisions are violated. One can directly that the builders are still not aware of the need for a thrifty attitude toward nature. And our possibilities of influencing the overall course of events are still limited. It is necessary to organize a centralized state service for ecological control of the region. Only then will we be able to provide for a comprehensive solution to technical, economic and ecological problems.

[Question] Give us, please, an overall evaluation of the rates of assimilation of the Yamburg deposit.

[Answer] The rates of assimilation are still low. The main reasons are the overall arrears in the engineering preparation of the deposit and in solving the transportation problem and also the late arrival at Yamburg and the inadequate concentration of the forces of construction subdivisions.

The lack of coordination of the actions of subdivisions of the Ministry of the Gas Industry, Ministry of Construction for the Petroleum and Petrochemical Industry and Ministry of Transport Construction as well as the poorly defined cooperation with other departments also had an effect. Thus Glavurengorygazstroy put off for practically a year the fulfillment of assignments for the construction of a gas line and the startup of mobile automated electric power stations. Because of this they failed to meet the earmarked deadlines for experimental work on the washing away of the ground for transport construction and it was necessary to reduce the volumes of operational drilling planned for 1985. The development of the energy base necessary for the assimilation of Yamburg is also in arrears. During the past navigation period they did not manage to provide for the delivery to Yamburg of a sufficient quantity of sand and gravel mixture for transportation construction.

All these current problems will be solved promptly if it becomes possible to coordinate the efforts of all departments more efficiently.

There is no doubt that the decree of the CPSU Central Committee and the USSR Council of Ministers adopted in August 1984 will contribute to this. It clearly lists the tasks of each ministry participating in the assimilation of Yamburg. The forces of all ministries are now already being concentrated. We attach a great deal of significance to the fact that in Yamburg there has finally appeared a master who will essentially control all the work for preparation and operation of the deposit. In September 1984 the Yamburggazdobycha Production Association was created. In November of that same year they organized Glavyamburgneftegazstroy, which became the general contractor for building up this northern giant. This will help to make the assimilation more planned and consistent, and will eliminate a certain amount of the chaos that is typical of the pioneer stage.

All of the experience of the Tyumen gas workers suggests that from the time of the first pioneering trip to the deposit until the beginning of its operation no more than 5 years should pass. We intend to stay within this time period in Yamburg as well, although in terms of the difficulty of the conditions for life at Yamburg 5 years is equal to 7 or 8 years at Urengoy or Medvezh'ye. At the beginning of 1987 the country should receive gas from Yamburg. We consider this task to be quite realistic.

[Question] What are the prospects for populating Yamburg, is it possible to make this region inhabitable?

[Answer] This question was discussed very extensively for 2 or 3 years and there were various points of view. We have not yet received an opinion from medicine. The planners are taking an extremely cautious position: thus specialists of the LenNIPIgradostroitel'stvo Institute, which is preparing the plan for the population point at Yamburg, thought that in the villages at these latitudes only young families could live and work and then only for a short period of time, but their children should be left in the "mainland." Therefore at first in Yamburg they planned to construct only buildings with small apartments and did not envision kindergartens or schools. Social, cultural and domestic services were "cut off" correspondingly.

But while the arguments are going on, the northern cities are growing up since no less than one-third of the people who come to the North become permanent population. And children are already being born in Yamburg (thus life itself is forcing us to revise our positions).

The Tyumen gas workers have a quite definite viewpoint regarding this: people will be living in Yamburg. It is impossible to assimilate such a large and promising deposit entirely by the watch and expedition method. A permanent population point must appear in Yamburg. It is necessary to make sure that it does not grow unjustifiably. Not an easy task! For comparison: the Urengoy deposit is not much larger than the Yamburg deposit, but in Yamburg it is intended to have one-fifth the population that is found in Urengoy. We are trying to hold back the growth of the population by reducing the number of workers involved in the assimilation and operation of the deposit. The gas workers hope to achieve this primarily with the help of progressive technical decisions. We shall also include organizational measures. Thus watch brigades from Urengoy and Tyumen can drill down to the gas-bearing layer at

Yamburg. We shall also try to use Urengoy's repair and supply support bases, constructing only transshipment bases at Yamburg. All this will also make it possible to do with a relatively small number of personnel for servicing the industry. Of course the basic personnel must live here, locally. This will include about 15,000 people. In addition to the gas workers workers from other departments participating in the building up of the deposit will also be living permanently in Yamburg, and this work is intended to last 15-20 years.

Now there is almost no doubt that the new city must not be built up for "temporary residence," but must have comfortable housing, and that kindergartens and schools will appear here, and that the city should enter harmoniously into the natural environment. But to do this it is necessary to work out certain planning decisions and to involve various departments in the construction of the enterprise. It is very important that a decision was made to develop in Tyumen the production of prefabricated residential buildings and social and domestic facilities made out of lightweight prefabricated structures for northern cities and villages. Even now one must be concerned about making sure that the necessary elements of the social and domestic infrastructure appear promptly in the city and that public catering, trade, transportation and all municipal services begin to operate immediately. The city of Yamburg should meet the modern criteria for the urban culture of the north.

FOOTNOTE

1. IZVESTIYA, 23 August 1984.

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HISTORY OF ASSIMILATION OF DEPOSIT OUTLINED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 48-49

["Chronicle of Pioneer Assimilation of Deposit"]

[Text] 1969

17 August--The collective of the Tazov petroleum and gas prospecting expedition discovered large accumulations of gas in the Yamburg area.

1982

19 January--A truck tractor train with a landing part left the deposit of Medvezh'ye, the northernmost installation for comprehensive preparation of gas No 9, and set out for Yamburg. In the convoy were 39 trucks and tractors and they were hauling living cars and equipment for a dining room, a boiler and two electric power stations. The pioneer landing party included drivers, machine operators, builders and other specialists of the Nadyngazprom Production Association. They had to cover 210 kilometers. It was 40 degrees below zero and there was a blizzard. Sometimes the speed of movement of the train dropped to several hundred meters an hour and the equipment could not hold up. They would repair it during their brief stops and the spare parts were delivered by helicopter.

24 January--The truck and tractor train reached the mouth of the Nyuda-Mongotoyepok River. The cars, the mechanisms, the fuel and lubricants, and tens of tons of various kinds of cargo necessary for building up the area were delivered without losses.

25 January--Participants in the landing party set up a radio station and reported that they had completed their polar crossing. A meeting was held at the place of the future city.

May--The construction of an approach channel from the Ob Bay to the mouth of the Nyuda-Mongotoyepok was started and completed. The shallow mouth of this tundra river was expanded by powerful explosions. Steamships could move freely in the bay that was formed. During severe storms in the Ob Bay, when

immense waves could wash a ship onto dry land, in this bay there was only a small tremor. The waves were "extinguished" by an artificial sand bank.

6 August--The first Yamburg navigation period began. A tanker arrived delivering fuel, and after it came ships with two prefabricated housing complexes for 400 people. During the navigation period they received a total of 20,000 tons of cargo.

10 August--Measures were taken for organizing communications. Reliable telephone communications were set up with Nadym. The Ekran television station began to operate.

September--Construction was completed on the first dining room which accommodated 60 people.

1983

January--The general construction contractors arrived in Yamburg. They began to build up the car city for the construction workers.

February--22 kilometers from the pioneer village assembly was started on the first drilling machine.

10 May--Drilling was started on the first Yamburg well.

August--In the pioneer village a medical point and a store for necessities was opened up.

October--The hydraulic construction workers began to construct the river fort.

December--The Yamburggazpromstroy Trust was created to build up the Yamburg deposit.

1984

March--The Yamburg division of the Nadym airport was created.

May--A dining room accommodating 30 was put into operation in the car city for the builders.

July--The Council of Secretaries of Party Organizations of Yamburg was created.

24 August--The first child was born in Yamburg. The parents were the river workers Tat'yana and Yuriy Shabalkov.

September--By decision of the Ispolkom of the Tyumen Oblast Soviet of People's Deputies the village of Yamburg of the Mydinskiy Rural Soviet of Nadymskiy Rayon was founded.

A temporary Komsomol organization was formed in Yamburg. The staff of the shock Komsomol construction site, "Building Up the Yamburg Deposit" was created.

The Yamburggazdobycha Production Association was created, which was to become the master at the deposit and be in charge of the work for preparing it for operation.

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POLAR EXPERIMENTAL WORK DESCRIBED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 50-55

[Article by Eval'd Semenov: "Experiment Beyond the Arctic Circle"]

[Text] ...A gloomy, low sky, a sharp cold wind. A thin layer of melted ground. The buzzing of mosquitos. The pale colors of the polar tundra are bordered by the leaden waves of the Ob Bay.

The landscape did not evoke any illusions in the manager of the Zatsibgidrostroy Trust, Anatoliy Semenovich Baklanov--and therefore the keen eye of the manager studied the locality in especially great detail and with special care.

It was the autumn of 1982. The managers sit on the ground which was not yet marked by a point on the map. Yamburg. The hydraulic construction workers would construct a river port, without which it would be impossible to assimilate the gas condensate deposit. But such a large amount of construction was unthinkable without one's own production base, which was located "at hand." It is now 1,500 kilometers to the nearest base. And for almost 200 days a year one cannot get there even by helicopter: the weather was too bad. Because of the storms and strong winds, the sharp ebbs and flows, the shoals on the capricious river with the difficult-to-remember name of Nyudya-Mongotoyepok. The favorable navigation period lasts for little more than a month. The winter period is no piece of cake either. Only in December are the marshes on the approach to Yamburg covered with solid ice, but there are frequent blizzards and then it takes no less than a week with automotive transportation to cover the 200 kilometers. And try to create anything under these conditions!

Baklanov had never had such a difficult assignment although he was no newcomer to the North and had the "Murmansk School" behind him (this is what he called his many years of experience working on the Kola Peninsula where he constructed more than 100 docks). Baklanov also had a good research background (he is a candidate of technical sciences and has published 47 scientific works). And somehow this symbiosis of science and practice should help him now!

As if searching for support points Baklanov glanced again over the cold flat plain and held his gaze on the little cars that could be seen a half-kilometer from the shore. People from Nadym who were the first to arrive here were already living there. Of course people from Nadym, as pioneers of the assimilation of the deposit, should be vitally interested in the construction of the river port. And it was in Nadym that it was necessary to search for the organization which would agree to take on responsibility for the assembly of the metal structures. Moreover, Nadym is the city closest to the deposit. In some ways the Nadym residents are already obligated to the trust which constructed the dock on the Nadym River which meant a great deal for the development of the region.

But this first plan, which had seemed so logical, was not destined to be carried out. Life made its own adjustments to the logic. The Nadym residents seemed to agree at first, and then they began to delay making a final decision, and finally they completely refused to cooperate. The manager had to fly immediately to Novyy Urengoy, for which the trust had also constructed a river port. But here the arrangements of business contacts proceeded with difficulty. So these norther cities were not able to help the hydraulic construction workers either. Not because of sheer ingratitude, but because of the poor transportation connections with inhabited regions.

Months passed in hassles and negotiations. It became increasingly clear to specialists of the trust that there was nowhere for them to get help for the hydraulic construction workers. The problem was "suspended in air" as before, and Yamburg remained unreachable. You cannot take technical equipment in by air--a helicopter will not lift an outsized cargo. So far it was impossible to arrange regular automotive transportation to Yamburg. It was also unthinkable to wait until the highway and railroads were constructed: for the hydraulic construction workers had to release the river dock without waiting for the completion of the road construction.

But a solution was found--and such a simple one that they could only be amazed: why had they looked for so long? Of course the Ob' was to "ship in" from Surgut the mechanisms, equipment, material and all the social, cultural and domestic facilities for the hydraulic construction workers. All that was left for them to think about was how they would live in Yamburg.

The fate of the first settlers is an eternal theme which spins its way through books, newspapers, movies and the sketchbooks of artists. "To be the first is an honor, and this means that it must also be difficult for the first." "The first settler is a strong person, he must not be capricious." "The temporary structure is his home".... There are so many "truths" like this which are repeated by people who have never been first settlers! And in fact the first settler is the most ordinary person. He has not been tested in pressure chambers, he has not been given scientifically substantiated time periods for acclimatization and adaptation. And the first settler is not even selected from the strongest and most worthy people. He himself, voluntarily and frequently despite common sense, moves into the most remote corners of the North. And if only because of this one should be concerned about him, and think about how to keep the stubborn searcher warm and protect him. But what

is there for protection--one can only somewhat reduce the influence of the harsh environment!

Considering things this way specialists of the trust were first inclined to think that it is necessary to begin by constructing a village for the first settlers who would be the hydraulic construction workers in Yamburg. The decision would be correct if one were to forget about the distance and the lack of roads. But, after all, the materials necessary for construction could not be delivered here sooner than the 1983 navigation period. This means that the hydraulic construction workers would have to take care of their own lives for an entire year. They would lose a great deal of time and would not manage to construct the dock by the planned deadline.

Should they try to go to Yamburg following the example of the Nadym residents? It would be nice, to be among the first to "settle in" here. But haste does not suit the hydraulic construction workers and it did not make it possible to develop life extensively and fundamentally in Yamburg. And the hydraulic construction workers were already tired of living in settlements, in seclusion, remote from the many benefits of civilization, a kind of life that had been forced on them for many years by the specific nature of their mobile labor. Only recently had they finally managed to escape from the vicious circle, and now many hydraulic construction workers are living permanently with their families in Surgut. So what would they think of again leaving their home for several years? No, they would certainly not interrupt their settled way of life--even for a great production necessity! Otherwise there will be increased labor turnover. What should be done?

And again experience and practice suggested a simple, reliable and tested means. The hydraulic construction workers knew that the watch method could be applied successfully when servicing petroleum fields. They decided to use it, but to prolong the time periods: for petroleum workers, for example, the watch would alternate with a month off. Of course the watch members would have to get from work to home by helicopter. But the pendulum migration would take place within one region and one time zone, and the change in climate is not very great this way. This means that all the possible negative factors would have less of an effect on the health of the watch members.

And Zapsibgidrostroy will try to get to Yamburg by itself, without anybody's assistance. The trust is conducting an experiment.

It acquired a written-off, 2000-tons barge for 7,000 rubles. They repaired it. And on the barge they constructed a building or, rather, a floating housing and administration complex. Under one roof they placed no more and no less than 30 standard housing blocks of the container type. They fixed up a recreation corner, a kitchen, a dining room, a warehouse, a refrigerator for groceries, a bakery, and a bath with a sauna. There is a water supply system with hot and cold water. There is a laundry in which one cannot only wash clothes, but also iron them. There are separate containers for water and fuel. It does without saying that an electric power station was installed "on board." They did not forget to allot several rooms for a hotel. With their own hands and with minimum expenditures the hydraulic construction workers provided themselves with complete autonomy in living.

And in September 1983 a caravan consisting of the floating housing and administration complex, a floating crane, barges with materials and mechanisms, and a cutter moved away from Surgut to the north. The repaired barge had to travel 1,500 kilometers. There was considerable risk and the specialists were concerned about the severe autumn storms in the Ob' Bay. The only thing that extinguished the alarm that burst out was the hope placed in the people. No, they did not select the best for this brigade and they did not put all of their best in a separate shop. Under the conditions of the North there is no room for competition, there is no room for encouraging individuality and exclusivity; cooperation of people with the most varied characters and qualities but who are unified in their desire to understand one another is more appropriate here. And on the way to Yamburg in the brigade of hydraulic construction workers, which was headed by Vasilii Matyukevich, there began a process of maturation of such a collective.

Yamburg greeted the floating "newcomers" with indifference, and the exotic caravan did not surprise anyone. People were frequently arriving here by boat, plane or motor vehicle. People and technical equipment arrived from Urengoy, Nadym, Pangod and other cities and villages. It was the height of the navigation period. Automatic cranes fussed about on the short wooden dock. They were barely able to process the cargo from the barges which was literally being dragged through the shallow water of the Nyuda.

For the time being the hydraulic construction workers forgot about their own problems and engaged in the common concerns: they helped to tow the barges and deepen the bottom of the canal. They became so involved that they almost forgot about the time when it was necessary to "dig in" to the planned camp for the winter. In the very literal sense they had to cut their way through the ice of the Nyuda in order to get to the point where it was planned to begin the construction of the dock.

It turned out that they could count on their autonomous living. The hydraulic construction workers almost never had to go ashore and bother people with their requests. The freezes became harder, the blizzards raged, but the home of the hydraulic construction workers remained comfortable and reliable. In the day room was a pool table and a color television set. In the dining room they eat to their hearts' content and without waiting in any line--the entire brigade can sit down at one time at the spacious tables. There is a place to dry out wet clothing before the beginning of the shift. And if you become chilled during your shift you can run into the living facilities and sit in front of a large heater.

To someone from the outside it would probably seem that the life of the hydraulic construction workers is quite devoid of any of the difficulties of newcomers. But still difficult days came here. The head engineer of the trust, Viktor Viktorovich Goncharov and the senior work supervisor, Vyacheslav Fedorovich Kharitonov were racking their brains trying to deal with the dirty tricks played by the freezing weather, which influenced the course of construction. The frozen ground on the narrow coastal strip was not solid, and it alternated with melted ground which was saturated with water. Sometimes 300-400 blows of a pile driver were necessary in order to drive a

pile a couple of millimeters. And another time the pile would go in deep very easily--this meant that it had run into melted ground. Doubts arose: will it be possible to construct a reliable dock on such shaky soil? For Yamburg will be receiving heavy and large-sized cargoes....

Then the blizzard winds began to blow for a long time and it became extremely cold on the guard shop. Additional heaters were turned on. But because of this the electric power station was overloaded and broke down. There was only enough power from the emergency station for lighting. It was necessary to turn on the main diesel generator of the floating crane. And they had wanted to "save" it until spring when it would be necessary for intensive work on deepening the approach channel.

Nonetheless the hydraulic construction workers could not foresee all possible problems when preparing for their first winter in Yamburg. The supplies of piles began to be exhausted sooner than they had expected. It was necessary to "scare up" additional deliveries and make shipments by motor vehicles from Surgut over the frozen ground. The hydraulic construction workers were very sorry that they had not equipped their own mechanics shop on the barge and had not provided themselves at least with a lathe. For every missing bolt and every small part had to be shipped in from far away.

When the winter had begun to subside the hydraulic construction workers began to look with concern at the Nyuda-Mongotoyepok, which was still quiet under the ice; they had heard about its willful ways. It turned out that their doubts were not without justification. On 13 June an icy mush was stirred up in the river. The first blow came to the auxiliary barge which was tightly "attached" by reeds to the wall of pilings. If it were torn away it would hit the floating crane and the floating crane would run into the watch ship.... For almost 3 days the hydraulic construction workers struggled to save their floating village from the meter-thick pieces of ice that were surging down the river....

And a month later, on 12 June 1984, considerably earlier than the planned deadline, the hydraulic construction workers released their first capital structure, to appear in Yamburg. The 102 meters of the wall of the dock were ready. A couple of days before this they had seen the arrival of a barge filled with slabs intended for building up the territory of the port. True, the first section of the port would operate under temporary conditions for the time being. They were still lacking two gantry cranes and thermal piles without which they could not completely guarantee the durability of the hydraulic structure. And the suppliers did not manage to send the components for installing the cranes or the thermal piles, and they did not expect that Zapsibgidrostroy would fulfill its assignment so quickly. It usually takes 1.5-2 years to construct dock walls of such size.

During the navigation period of 1982 Yamburg received 20,000 tons of cargo, and in 1983--50,000 tons. And in the navigation period of 1984 there were 5 times this amount. So even the temporary conditions for the port make it possible to solve large problems for Yamburg and to sharply increase deliveries for the deposit. The great economic effect from early completion

of construction is obvious. And river transportation is still the most reliable here.

The experiment of the Zapsibgidrostroy Trust can be considered successful. In addition to other things, the hydraulic construction workers proved to themselves and to others the advantages of using a mobile floating housing administration complex during the pioneering assimilation of deposits. There is no need to spend time on the many complicated affairs related to domestic construction. It takes less electric energy to heat the complex than is required for individual cars. There are almost no sharp temperature changes in the floating building and fewer colds. Here it is easier to maintain cleanliness and the living is on a higher level. The collective all lives under one roof--and this means better conditions for solidarity.

Analyzing the lessons of the first winter in Yamburg, specialists of the Zapsibgidrostroy Trust thought that on the barges they should have set up garages for technical equipment and shops for the repair service. Because of the utilization of "floating housing" it was possible to get by with considerably fewer temporary settlements and to protect the easily wounded vegetative layer of the tundra. And after the completion of the buildup of the deposit there was no need to disassemble the housing. When at last ships with large cargo capacities appear in the North on a "floating cushion" the floating complexes can be delivered quickly to practically any place.

The trust intends to continue this experiment. On the basis of the Yamburg section it is organizing the transpolar floating construction detachment. After the river port in Yamburg is released the hydraulic construction workers will sail along to the Noviy port, and then they will wait their turn at Kharasavey....

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ROUND-TABLE DISCUSSION DEVOTED TO TPK

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 56-89

[EKO round-table discussion: "How To Manage a TPK"]

[Text] The TPK in Our Life

For the 3rd Five-Year Plan now the directive documents of party congresses have envisioned the creation of territorial production complexes (TPK). Each such TPK is of immense national economic significance and involves an intensive solution to the regional interbranch problem of enlisting into production the significant and even unique natural resources.

The new form of territorial organization of production promises many advantages. What are they? Briefly, they include the possibility of a comprehensive, unified approach to various kinds of productions in technological and economic integration, which makes it possible to create a common production and social infrastructure for the entire complex, to create enterprises with various specializations within the complex, and to extensively utilize combination and cooperation of production.

A unified infrastructure produces an advantage of many millions of rubles and makes it possible to economize on construction, transportation, communications, electrical and thermal supply, and warehousing. The set of enterprises with various specializations and combination and cooperation make it possible to utilize more completely and comprehensively the labor and natural resources, the infrastructure, the construction and energy bases, and wastes (for example, it is possible to sharply reduce the volumes of casing head gas that is burned in torches). Under the conditions of the TPK it is easier to solve ecological problems, it is easier to change over to waste-free production, less land area is required and time

periods for construction are reduced. The larger the scope of the TPK, the more participating branches and various kinds of facilities are included in them, and the greater the economic effect the complex can produce. The TPK is a progressive form of organization of productive forces. They correspond to modern ideas about management of the economy and the party course toward intensification of the national economy. All there is left to discuss is the social significance of the TPK, which provides for the assimilation of new territories and the rapid development of poorly assimilated ones.

Why the "Round Table"?

(From the introduction of the leader)

A. G. Aganbegyan, academician, director of the Institute of Economics and Organization of Industry Production of the Siberian Branch of the USSR Academy of Sciences, editor in chief of EKO: With the help of the TPK it has been possible to do a great deal, but there is still more to do.

The Siberian TPK's, the Pavlodar-Ekibastuz in Kazakhstan, the Timano-Pechora in the European part of the USSR, and the Southern Tajik in Central Asia have made it possible to create new all-union bases for the petroleum, gas and coal industry, electrical power engineering, energy-intensive and other productions, they have provided for all of the unionwide increase in the extraction of petroleum, gas and coal under the 10th Five-Year Plan, and they considerably improved irrigation in cotton-growing regions. Territorial production complexes are involved in all of the country's energy prospects as was envisioned by the USSR Energy Program. The Western Siberian TPK means all petroleum and gas, and in the north of Tyumen Oblast--all of the increase in the extraction of gas. The KATEK and Ekibastuz mean coal and energy. Possibly the formation of new raw material bases for the chemical industry which is directed toward implementing the Food Program is related to the BAM zone and the north of Krasnoyarsk Kray. The future of the timber and wood-processing industry is tied up with TPK. Looking back at the path that has been traveled we have the right to ask ourselves: have we done everything as well as possible? Unfortunately, it is impossible to give an affirmative answer to this question. Are expending more resources in places where it is possible to make do with less, and we are not always obtaining the proper effect from investments. In many cases this is clear to the naked eye. What are the reasons for this situation and how to we eliminate them?

The majority of researchers and practical workers think and, in my opinion, they are correct, that the reasons for the unsatisfactory situation with respect to the TPK lie in the area of planning and management. Let us turn our attention to the nature of the object of management. The TPK is located at the juncture of the interests of branches and territories; current, medium-range and long-range tasks; science and practice. There have been many individual decisions regarding problems of the TPK and they have played a positive role, but experience has proved them to be inadequate and also sometimes contradictory. It is necessary to have intercoordinated improvement

of the TPK in all of its aspects: organizational, structural, functional, preplanning, planning, economic, legal and so forth.

Therefore such a broad range of us have gathered here today, perhaps for the first time in the practice of considering problems of the TPK: economists, legal experts, planning agency workers, financial experts, geographers.... We will have to analyze the experience of the creation of the TPK in all of its manifestations: its successes and shortcomings, mechanisms and conditions for the appearance of all of these. For if in various TPK we encounter the same arrears in the social infrastructure this is hardly an accident. Having revealed these conditions and mechanisms we will have a firm basis for evaluating the proposal to eliminate them. And this is the goal of our meeting.

The Bratsk Experience

M. K. Bandman, doctor of economic sciences, chief of the sector for the TPK of the IEiOPP of the Siberian Branch of the USSR Academy of Sciences: After the "Bratsk lessons"--a memorable article in LITERATURNAYA GAZETA--for many this was enshrouded in negative tones. There were indeed shortcomings in Bratsk and the newspaper discussed them correctly. They included, for example, the arrears in housing and a certain lack of synchronism in the startup of the main objects. But there were also undoubted and significant achievements there. They are no less instructive if only because they have not always been repeated in other TPK.

The creation of the Bratsk TPK was preceded by fundamental scientific and planning development which was started even before the war and continued through two serious scientific conferences in 1947 and 1958. This approach made it possible not only to clearly determine the structure of the complex and its scope (thus even before the construction of the GES it was clear that there would be an aluminum plant and a timber industry complex), but also to coordinate the time periods for the construction of the facilities. Still, for example, the Boguchanskaya GES will soon go into operation but it is not yet clear what facilities will be there.

The creation of the Bratsk complex began with the formation of a construction organization which from the very beginning was assigned a regional and not a branch significance. There were no doubts about the interbranch nature of the tasks of Bratskgesstroy from the very moment of its organization. Even though it was and still is under departmental jurisdiction, it was instructed to construct facilities for various departments. The relationship between "others" and "its own" industrial facilities in terms of value amounted to 2:1.

The Bratskaya GES was declared an all-union shock Komsomol construction site, and people from throughout the country began to come here. But they did not simply wait for help from the center, but also acted--they created a skeleton crew of 1,500 local communists and Komsomol members, which made it possible to reduce the usual amount of turnover at large construction sites. Here, in particular, was a manifestation of the active attitude toward the construction

site on the part of oblast soviet and party agencies. Unfortunately, attitudes of dependency are encountered more frequently.

The managers of Bratskgesstroy immediately entered on a course toward creating their own base of the construction industry, which provided this organization with the necessary stability and made it possible to construct several large objects at the same time. Construction in the Bratsk complex began with the social and domestic infrastructure, with housing--this is another important merit which distinguishes it from other complexes.

Finally, it should be noted that in the first stages of the formation of the complex they achieved actual one-man management. True, this involved not so much the organizational structure of management as the personal qualities of our outstanding leader, the chief of Bratskgesstroy, I. I. Naymushin, who went beyond the official framework of his duties and tried to keep hold of the complex as a whole.

If one looks into the Bratsk experience attentively one can assert that its shortcomings are mainly related to the deviation from the selected strategy of management and to the fact that they did not manage to adhere to it consistently. Let us take housing.... The financing of its construction depended on individual ministries from which they had asked for industrial facilities, and there was no mechanism for coordinating efforts or for planned financing of construction. The situation was not improved either by the fact that the housing had already been started or by the fact that a board of directors had been created for the construction of Bratsk which acted as a unified client. This, incidentally, was another significant merit of the Bratsk experience.

A. G. Aganbegyan: The construction organizations and their capacities constitute one of the key factors in the effectiveness of the TPK. If Bratskgesstroy had not had a powerful and smoothly operating collective, it would not have been able to achieve those results which it achieved, and it would not have provided a model for a state approach to the matter. Nobody had constructed anything so rapidly: the GES--5.5 years, the aluminum plant--four buildings a year. Actually this collective assimilated the entire region of Bratsk--Zheleznogorsk--Ust'-Il'msk--Boguchany.

But, having completed one object, the construction workers frequently do not know what they will be doing the next day. Krasnoyarskgesstroy is being released at the Sayansk complex. Initially it included 22,000 people, then 18,000, and now only 12,000. There are no prospects.... They will complete the construction of the small Maynskaya GES, and what they will do next is still unknown.

Sometimes the lack of a work front leads to a situation in which the collective disintegrates, as was the case with Taymyrgesstroy, and sometimes this is because of decisions that are not justified from national economic positions. For example, in Bratsk they spent 4 years constructing the heating equipment plant. It receives raw material from the European part of the country and half of the products are sent to the Urals and beyond. Only the free construction capabilities determined such a distribution.

Together and Apart...

B. N. Annenkov, candidate of economic sciences, Moscow: The greatest effect is achieved in places where the ministries and departments that are doing the building operate in close interaction with one another and with local agencies, where cooperation and specialization in production are taken into account, and where common objects of the production and social-domestic infrastructure are created. For example, in Krasnoyarsk Kray about 50 percent of the capital investments are used for constructing the complex of enterprises. This reduces their estimated cost by 4 percent and more, and reduces the distance of communications, sidings and the built-up territory to 30 percent. Comprehensive construction of enterprises in Vitebsk has led to a reduction of the number of objects from 50 to 17 and produced a savings on capital investments in the amount of 7 million rubles.

If these conditions are not maintained various shortcomings appear. Unfortunately one must say that many of these shortcomings can continue. They include, first and foremost, uncoordinated departmental actions, the isolation of branch ministries in planning, construction and operation of enterprises and other objects of the complex. To what does this lead? In Tynda 14 departmental settlements with 38 boilers were formed. In Surgut the residential areas are heated by 25 small boilers even though they have an extremely large GRES. More than 20 ministries and departments create their own water supply and sewage systems, frequently duplicating one another.

The creation of unified railroad centers in just 10 industrial centers of Western Siberia will release 3,600 workers, 6,200 cars and 100 locomotives. In housing construction alone it will be possible to save more than 150 million rubles a year.

M. K. Bandman: In Minusinsk it was suggested that they construct a complex of 12 plants of the electrical equipment profile which would satisfy the needs of the region for many kinds of electrical equipment. The object was evaluated at 2.5 billion rubles, but the Ministry of the Electrical Equipment Industry allotted so much capital for it that the construction would last...110 years. They constructed--and then only partially--three plants, and up to this point the ministry does not have a firm plan for the development of the object as a whole.

As part of the Sayansk TPK in Abakan it is intended to construct a plant for processing nonferrous metals. It was suggested that it could participate on a shared basis in the creation of a heating network. But the ministry did not construct the plant, it did not allot funds for shared participation, and when the TETs was able to produce heat for the city the network was not ready.

A change in the volumes of financing and the time periods for the construction of facilities reduces the effectiveness of the complex. The Sayanskaya GES has been under construction for 17 years, the aluminum plant in Krasnoyarsk has been under construction three times as long as the Bratsk one was, and the aluminum plant in Achinsk has also been under construction for a long time.

Investigators are trying to systematize the shortcomings encountered by TPK's (some of these were discussed at the "round table" and some of them are known from the literature). Here is the list suggested by M. K. Bandman:

violation of the established time periods for construction and changes in the volume of financing by the ministries;

rejection of the construction of coordinated facilities;

the lack of prospects for the development of construction collectives;

the arrears in the social infrastructure;

underestimation of the role of agriculture in the zone of the complex;

unsubstantiated development of light industry in the TPK;

incorrect evaluation of the resources;

isolated consideration of problems of individual branches;

the lack of decisions regarding principle issues.

Let us turn now to the most important component in management and see how it is carried out.

Planning and Financing of the TPK

Let us recall that the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Improving Planning and Stepping Up the Influence of the Economic Mechanism on Increasing the Effectiveness of Production and Improving the Quality of Work," (July, 1979) envisions the development for the largest TPK's of costly programs, the main indicators of economic and social development, and consolidated plans for capital construction. The planning of a number of large TPK's is envisioned in the "Basic Directions for the Economic and Social Development of the USSR During 1981-1985 and the Period Up to 1990." The USSR Gosplan prepared and in January 1980 approved the Methodological Instructions for the Development of Comprehensive Target Programs for Solving Regional Problems and Forming and Developing Territorial Production Complexes."

B. Ya. Dvoskin, doctor of geographical sciences, deputy director of the Institute of Geography of the Kazakh SSR Academy of Sciences: In our republic we are not satisfied with the existing plans for the development of the TPK. Actually they should not even be called plans. They are, rather, the sum of indicators for the enterprises and branches that are included in the TPK, more a summary of data than a serious plan for the development of the complex.

The territorial planning division of the USSR Gosplan sent us 11 forms for documenting the consolidated plans of the TPK. This is possibly not a bad beginning, but it is quite inadequate. These forms are a small part of the overall forms and indicators for the development of the republic. They do not

include that which would reflect the specific features of the TPK as distinct from other objects of territorial planning.

In particular, they do not envision balance developments even in calculation indicators. And how does one provide for coordinated development of the TPK without balances of labor resources, mineral raw material, construction materials and capacities? For complexes it is very important to analyze intrabranh and interbranch ties, but not enough is being done to make this possible....

It is the lack of comprehensive planning that explains the situation that has arisen in the Pavlodar-Ekibastuz TPK. Its formation is lagging behind the planned time periods because of the construction base, the social and domestic infrastructure and labor turnover. In Ekibastuz under the 10th Five-Year Plan they planned the startup of four energy blocks. Not a single one was introduced. Although under the current five-year plan the situation will improve the arrears are inevitable.

P. D. Podshivalenko, deputy chairman of the USSR Stroybank, professor (currently a professor at the Central Interdepartmental Institute for Increasing Skills of Management Personnel in Construction under the Moscow Engineering and Construction Institute imeni V. V. Kuybyshev): the investigation conducted by the USSR Stroybank of the effectiveness of capital investments at eight TPK's under the 11th Five-Year Plan showed that the complexes had not actually been the objects of planning. The existing plans are only the sum of indicators of the branch plans. There were no elements of a broader, not to mention a creative, approach. The social and domestic infrastructure and construction suffer most from this. The implementation of the program for housing and civil construction is lagging behind at all eight of the complexes. The deadlines for putting them into operation were not met at many capacities and objects. As before, each construction organization is concerned only about the creation and strengthening of its own production base. There is no plan for a unified base in a single one of the TPK's. New enterprises are being planned, for example, for reinforced concrete items, although the capacities located nearby are not being utilized. Calculations of the effectiveness of capital investments for the plans that are being implemented do not take into account the work of other enterprises on the basis of the complexes.

B. N. Annenkov: The construction of objects of the TPK is financed mainly on a branch basis from various sources. During the period of pioneering assimilation of the region this makes it possible to maneuver resources and to concentrate them on the facilities that are to go into operation first. But with an increase in the number of construction ministries there is a sharp increase in departmental separation and isolation, and parallelism in financing, construction and operation of the production and social-domestic objects. As a result the utilization of the infrastructure is not effective enough and there are disproportions in the development of the production and nonproduction spheres.



Territorial-Production Complexes Under 11th Five-Year Plan

Key:

- | | |
|----------------------------------|-----------------|
| 1. TPK of Kursk Magnetic Anomaly | 12. Tobolsk |
| 2. Timano-Pechorskiy | 13. Ekibastuz |
| 3. Western Siberian | 14. Pavlodar |
| 4. Southern Yakut | 15. Abakan |
| 5. Southern Tajik | 16. Sayanogorsk |
| 6. Pavlodar-Ekibastuz | 17. Krasnoyarsk |
| 7. Sayansk | 18. Minusinsk |
| 8. KATEK | 19. Berkakit |
| 9. Kursk | 20. Dushanbe |
| 10. Urengoy | 21. Moscow |
| 11. Surgut | 22. Toms |

Many people place their hopes in shared financing of the construction of objects. Unfortunately, this form encompasses an insignificant proportion of the investments and is not included well in the current system of management: there is no guarantee of the fulfillment of commitments by the shareholders and it is difficult to centralize the resources of the construction ministries who do not want to forfeit their economic independence (therefore, for example, in Ekibastuz the Ministry of Power and Electrification and the

Ministry of the Coal Industry constructed two practically identical wood-processing enterprises). Let us add to this the differences in the financial capabilities of the builders, the lack of planning of objects that are common to the industrial center and the complex on an interdepartmental basis, the difficulties with material and technical support for collective construction and the financial and material complications which fall on one of the shareholders (most frequently the head builders) when transferring the objects to their books for operation....

Shared financing is used only for objects of the infrastructure, mainly for social and domestic purposes. Questions of combined construction of basic facilities and those that are related to them which have a certain significance for comprehensive formation and effective functioning of the TPK are not being resolved.

A. G. Aganbegyan: The Gosplan has an institute for curators. These are deputy chairmen who are responsible for the corresponding group of branches. Territorial problems are also within the domain of the deputy chairman of the Gosplan, but in addition to these he has more than a dozen other complicated functions. In the relatively small territorial planning division each worker handles objects with estimated values in the billions of rubles while, say, ferrous metallurgy or the coal industry, which are known to fall behind the TPK in terms of the amounts of capital investments, are handled by dozens of people. The very nature of our planning is a branch nature. Standing behind the branch plan, as a rule, is a strong scientific research organization. For example, Gidroyekt includes thousands of workers, dozens of doctors and hundreds of candidates of sciences and specialists. Everyone uses their data and calculations, and turns to them for references. But from whom can one receive information regarding, for example, the Sayansk TPK? Nobody keeps any special information on it and nobody carries out calculations....

Management Under the Object or the Object Under Management?

Proposals concerning the formation of the TPK arise first in the stage of preparation of the USSR General Outline (20-25 years). It is developed by the SOPS under the USSR Gosplan with the participation of many scientific and planning organizations, the USSR Academy of Sciences, the USSR State Committee for Science and Technology, and republic ministries and gosplans. In this document they justify the need for the creation of a TPK, give its general economic and economic-geographic description, outline the scope, and roughly determine the groups of branches of the specialization.

Even in this stage the approach to the TPK is distinguished by its clear branch coloring. A solution to a large interbranch regional problem of national economic significance using a TPK is replaced by considerations about making sure that the expenditures of each individual branch do not appear excessive. Such a narrowing of the approach comes from the ministries which, in order to make their variants "pass," join together and make the corresponding proposals for the development of the USSR general outline. It is also important to emphasize that the General Outline is based on information that is basically submitted by the branch scientific research institutes. Such an approach to the TPK is fraught with unexpected

occurrences in the final stages, particularly changes in the group of branches.

When preparing the "Main Directions for the Development of the National Economy" (for 10 years) outlines are drawn up for the development and distribution of the branches or they do technical and economic substantiations (TEO), and they clarify the distribution of capacities, the time periods for the introduction of facilities and the need for resources, but the capacities of the construction base and other infrastructural branches are not coordinated with the needs for them and the basic objects of the complex are not substantiated from these positions. The infrastructure is there in general expenditures only as a share, a proportional need of the branches. Title lists formulated on this basis are not oriented toward the possible limits on resources and capacities of the infrastructure.

And although in this stage the branches can declare their productions to be part of the TPK since this way it is easier to have the title list approved and receive limits, nobody really brings together the branch outlines and the TEO. The complex is not regarded as a system, no plan is created for the TPK, and the infrastructure is not developed.

By the time for the stage of preparation of the five-year plan, when the needs are coordinated with the capabilities and the limits of resources are determined, there practically is no complex. It cannot submit a unified request for resources and therefore, in particular, when adjusting the title lists in keeping with the limits one production or another can leave the TPK along with its share of the infrastructural support.

Decisions of recent years have envisioned including the TPK in the technology of planning the national economy and reflecting the main indicators for eight of the most important complexes in the plan for the economic development of the USSR during 1981-1985, but the experience in the development and implementation of the first five-year plan for the TPK showed that there is still a lot that needs to be done on the path to transforming it into an effective tool for solving the national economic problems that have been set for the TPK.

From what has been said one might draw the conclusion that the existing system of management, which is based on the dominance of branch ministries, is not properly dealing with the TPK. This is reflected in the losses, the repeated shortcomings, the lack of adaptability of planning, the weakness of legal regulation and coordination, and the lack of agencies which could actually manage the complexes. Even the fact that not a single complex has had a unified plan gives one pause. Apparently "adding on" the TPK to the existing system of management will not produce the necessary results.

Why do the ministries carry the financing of their facilities in the TPK over from one period to another, leave the complex, fail to fulfill their commitments for the construction of the common infrastructure and transfer their funds to the basic objects? Such "independent" behavior on the part of the ministries is typical, incidentally, of more than just the TPK; it is determined by the imperfection of planning and management, the assignment to

the ministries of functions that are not properly theirs, and also their own interests. The Magnitogorsk Metallurgical Combine, for example, maintains communications and a trolley for a city of 400,000, and Bratskgesstroy--housing for a city of 200,000. KATEK is just being created, but here too they have the typical difficulties. KATEKenergostroy has constructed a bakery in Sharypovo, but it cannot transfer the necessary equipment there since no limits have been set. Its operation requires the corresponding services, operations personnel and repair workers. Difficulties arise with the sale of bread since the bakery is intended for the future personnel of Sharipova. Is it appropriate for the Ministry of Power and Electrification to handle this?

The ministry includes in the drafts of the title list the maximum number of facilities (especially large ones), striving to provide future prospects for itself and to obtain more limits on capital investments and other resources in order to have greater freedom for maneuvering. At the present time the limits on capital investments and construction and assembly work for the various ministries are not yet known. They are determined from the overall number of investments throughout the national economy and they depend on the increase in output in the various branches. As a rule, the branches receive the limits on capital investments and construction and assembly work in an amount of two-fifths to one-third of the amount required according to the title list, and then they have to eliminate objects (or parts of them) from the title list or else increase the normative time periods for construction. In either case this finally leads to adjustment of the plans, expenditures on financing, dispersion of funds, increased amounts of incomplete construction, and so forth.

The objects of a TPK are capital-intensive and costly objects. Therefore in the event of a threat of underfulfillment of the branch plans, the interests of the complexes are the last to be taken into account.

The prevalence of the individual (branch) to the detriment of the whole (complex)--this can characterize the situation with respect to management of the TPK.

Many proposals have been advanced in research in recent years. The majority of them agree with the idea that the TPK requires special management. But what should this be? What agencies should provide it? Using which methods? There is no unanimous opinion regarding these questions. One can single out three main viewpoints. According to the first the management of the TPK is a matter for the local soviets. There is no need to create special agencies. Proponents of the second position suggest using various forms for managing the TPK, but mainly similar territorial economic associations on the basis of shared participation and industrial associations on a cooperative basis. The third point of view (it is shared by the majority): in order to manage the TPK it is necessary to have special agencies of a government rank.

Various Points of View Regarding a Single Problem

V. A. Perttsik, doctor of jurisprudence, All-Union Scientific Research Institute of Soviet Legislation: I think that, for example, in Krasnoyarsk Kray, where there are several TPK's of a union scale, it is necessary to

create a governmental agency--say, a regional council headed by an authorized representative of the USSR Council of Ministers (it is not a matter of the name, but of the purpose of the agency). It would direct the activity of the ministries and departments on the territory and coordinate it. Thus the government would have its advance post in the complexes of Krasnoyarsk Kray. In order to consider the contradictions which cannot be resolved locally and to carry out strategic and other functions, it is necessary to have an agency in the center--a commission of the Presidium of the USSR Council of Ministers. I wish to note that the USSR Constitution envisions the possibility of delegating the authority of the USSR Council of Ministers to various of its agencies.

As for the authority of the regional soviet, we have an analogue--the agroindustrial complexes (APK), which have a right to redistribute capital investments and material-technical and other resources among the branches of the APK. This council could properly manage the TPK with centralization of administrative and management functions, delegation of authority to individual organizations, and concentration of some of the capital in organizations under its jurisdiction.

B. Z. Mil'ner, doctor of economic sciences, deputy director of the All-Union Scientific Research Institute of System Research of the State Committee for Science and Technology and the USSR Academy of Sciences: Regardless of the form in which such a government agency may be embodied--an authorized representative of the Council of Ministers, a commission of the Council of Ministers, a territorial agency under the jurisdiction of the government--it would be necessary, in the opinion of proponents of this point of view, to have direct state management, which would prescribe, order and direct. Let us compare this method of management with what should be done for the creation and functioning of a TPK. It seems that the problem can be reduced to carrying out large projects jointly. This means cooperative activity on the part of various departments, productions, agencies and organizations on the basis of the utilization of combined resources. A large cost-accounting [khozraschet] territorial association could become such a form of management. It is necessary to have true economic integration of forces and not simply one management agency or another.

World experience in the implementation of programs shows that the best results are found in the form of cooperative management locally. In Hungary, for example, it is sufficient for the agricultural cooperatives to gather the money and find the planners and builders in order to deliver a meat combine for several agricultural cooperatives. There is no need to write to the Gosplan and request funds or wait around in the waiting rooms of the ministries.... In order to assimilate the valley of the James Bay River, the Canadians created a state management organization which had capital amounting to \$10 million and was in charge of implementing a plan costing \$12 billion. They enlisted for this work a multitude of organizations on an economic basis.

Of course, not everything is that simple, as they say. But the time has come for us to think about this seriously. All of our management experience convincingly shows that in the proposals concerning the management of the TPK one cannot be limited to half-measures, and this means that it is necessary to

rely on cost-accounting relations among the participants. Of course the organizational forms of management cannot be identical for different TPK's. In some cases it is sufficient to regulate the relations of the participants through the plan, and in others it is necessary to have coordination functions, while in still others a special agency is needed. It is not important what it is or where it is located, but it must actually be responsible for the formation and implementation of the program, and to do this it must arrange its relations with the builders, the clients, and the consumers on a cost-accounting basis.

Of course the creation of some certain agency on a purely administrative basis is the simplest decision. But it is almost the most ineffective one: there will simply be another organization with its own interests.

Ye. I. Korenezskaya, candidate of jurisprudence, Institute of State and Law of the USSR Academy of Sciences: In the management of the TPK one singles out interbranch coordination and coordination of the interests of the branches with the territory and the population living on it. But, after all, the corresponding territorial agencies and a particular staff already exist for this: the local soviets. The local soviet is perhaps not powerful enough and is not sufficiently supported structurally and materially. But its rights are quite adequate for this kind of action.

It is easier to add on to something that exists than it is to plan something new. When reconstructing the apparatus of the local agencies of authority it is quite possible to make them responsible for functions related to the management of the TPK, if only as part of their interests in the development of the territory. Nobody can provide control as well as the local authority since it knows better than anyone the needs and the possibilities of the territory. If one takes this path it is possible to construct an agency which will be responsive both to branch and to territorial interests.

V. P. Mozhin, academician of VASKhNIL, doctor of economic sciences, chairman of the SOPS under the USSR Gosplan: Those shortcomings which we are encountering in the TPK are found frequently also in Moscow, at Atomash, and in the city and the rayon. It is just that in the TPK they stand out more sharply. Therefore a solution to the problems of the TPK, in my opinion, is inseparable from the way we approach the combination of territorial and branch planning and management as a whole.

We have no clear-cut division of functions. The ministries frequently engage in the affairs of local soviets (for example, housing construction), and the soviets utilize the capacities in production which is located a long way away from them. There are branches which should be centralized and yet, for instance, in construction and in the social and domestic spheres it is better for the territorial aspect of management to prevail.

Why are TPK's created? It is possible to gain the effect from integration of productions by management technological ties among branches with the help of direct agreements. We are speaking about TPK's that have been formed, and in the stage of the formation the largest issue is construction. It seems to me

that one should combine the construction organizations of the territory and transfer some of the production infrastructure to the local soviets.

And, of course, it is necessary to have a board of directors for the TPK that is being formed, which would centrally manage the resources, distribute capital investments, and be responsible for the construction part, for otherwise the lack of balance of the objects and similar shortcomings would reduce the effect to zero as it has before. The experience of coordination commissions shows that their rights are inadequate.

V. D. Rudashevskiy, candidate of jurisprudence, All-Union Scientific Research Institute of System Research of the State Committee of Science and Technology and the USSR Academy of Sciences: People frequently refer to joining the participants in the creation of the TPK together "under one roof"--they say it is necessary to have a single master. If one counts up how many TPK's and other complexes (agroindustrial, transportation, energy) we have and estimate how many interbranch problems arise during the interaction of ministries and departments, it becomes clear that any special super departmental organizational structures will complicate the system of management of the national economy which is complicated enough as it is.

Why do we need such a superagency? In order to integrate the efforts of various subsystems and direct them toward the final result. Coordination now does not have enough direction, commitment, sanctions or responsibility. It is possible to strengthen coordinational management with the help of agreements. The practice of management has already taken this path. Various agreements have been concluded, which sometimes do not have legal force or even contradict the law. These agreements make up for the lack of coordination itself, which must make decisions taking into account the interests of the partners. Because of the lack of legal support the agreements encounter great difficulties. In order to put the Sayano-Shushenskaya GES into operation ahead of schedule, 28 planning, scientific research and production associations and organizations of various departments signed an agreement for cooperation. They went further than the usual agreement for socialist competition and drew up a comprehensive network schedule which became a part of the state plan of each of the partners. The implementation of this plan was guided by the coordination council whose decisions were carried out on a voluntary basis and in the event that there were conflicts it was supported mainly by the party leadership. The same situation arose in the management of the Leningrad Transportation Center.

There is now the prevalent idea that management by nature excludes compulsoriness except when it comes to higher authorities. Therefore it is necessary to choose between the Scylla of extensive application of one type of agreement (economic) and the Charybdis of unjustified narrowing--of the other (administrative-management). Such agreements make it possible, without changing the management system and without creating a new stage in it, to regulate more effectively the complicated and sometimes contradictory relations among participants in the creation and functioning of TPK, and they provide for relative autonomy in the regulation of interrelations among participants and the protection of them from unjustified intervention ("We have an agreement!"). The procedure for the coordination and adoption of

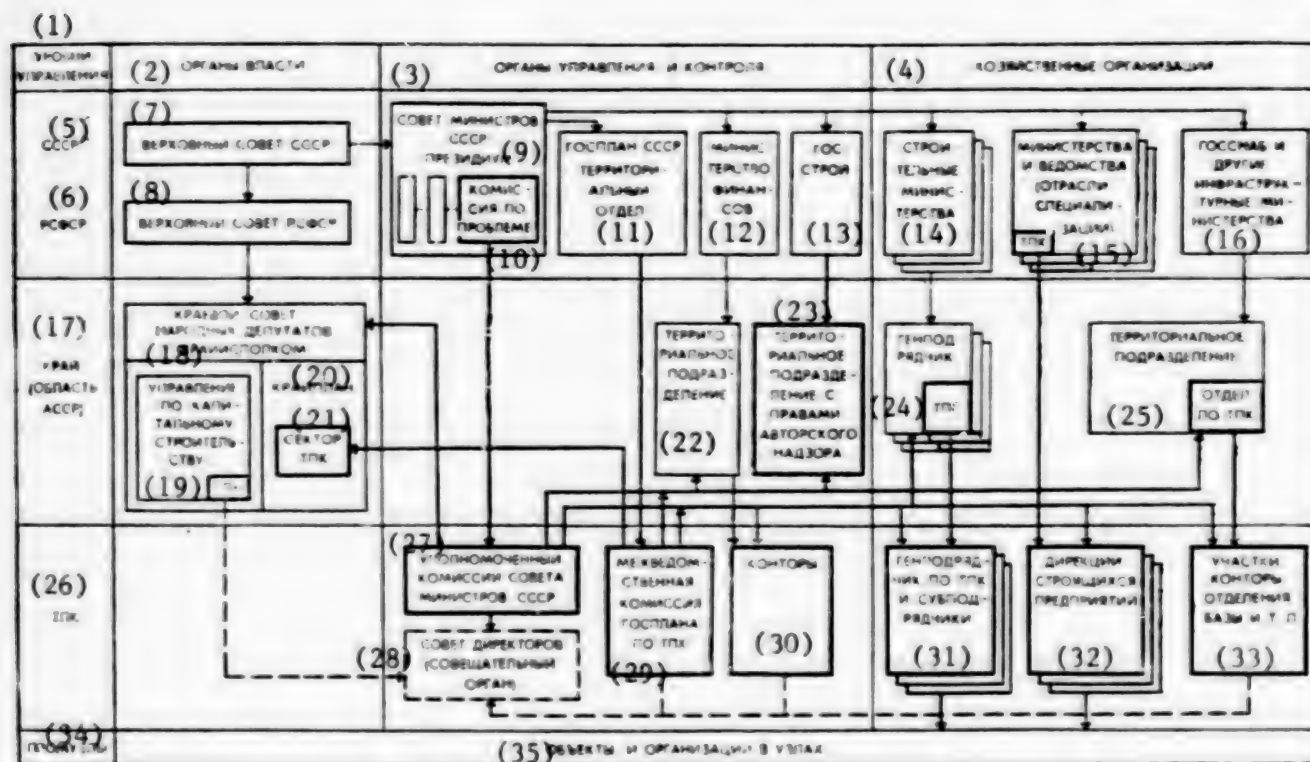
joint decisions becomes considerably simpler because there is no longer a need to turn to the higher agencies in order to solve the problems. A sample agreement of this type has been drawn up and is being prepared for introduction in various objects of the national economy.

P. D. Podshivalenko: We have a tradition of creating for a large statewide object (the Western Siberian complex, the BAM, AvtoVAZ, KamAZ) a governmental commission which regulates interbranch relations. This form has proved itself well and will apparently be used in the future. But it is unrealistic to create such commissions for each TPK. Different solutions are needed. One of them, in my opinion, is to create coordination councils with rights which would enable them to participate in the formation of plans and title lists, to control the fulfillment of the plans by the branches in the given TPK as well as their stability, and to approve all changes in the plans and the designs for the construction projects. It must be stipulated which functions will be transferred from the ministries to these councils. They could approve or at least recommend plan for approval, conduct expert evaluations, and give the corresponding recommendations to the ministries. The coordination council should include representatives of the leading organizations, ministries and party and soviet agencies in the region and their composition should be approved in the USSR Council of Ministers.

I agree that the social infrastructure should be brought closer to the local soviets. The ispolkoms can play the role of a single client and supervise the fulfillment of plans for the buildup of cities. Why not concentrate in their hands the currently dispersed capacities for housing and civil construction along with the construction base? There is experience in this in the country.

The TPK, like the various regions, must have a unit of the USSR Gosplan which would keep in contact with the coordination council and the local agencies of authority.

M. K. Bandman: We are proceeding from the idea that the TPK is an object of planning on a statewide level and that its creation involves the implementation of target programs for solving large regional problems. This determines the system of management of the TPK which should thus have the following appearance.



Tasks, Stages of Formation and Branches of Specialization of TPK's Under the 11th Five-Year Plan

Key:

1. Level of administration
2. Agency of authority
3. Agencies of management and control
4. Economic organizations
5. USSR
6. RSFSR
7. USSR Supreme Soviet
8. RSFSR Supreme Soviet
9. Presidium of USSR Council of Ministers
10. Commission for problem
11. Territorial division of USSR Gosplan
12. Ministry of Finance
13. Gosstroy
14. Construction ministries
15. Ministries and departments (branches of specialization)
16. Gosnab and other infrastructure ministries
17. Kray (oblast, ASSR)
18. Kray soviet of people's deputies, krayispolkom
19. Capital construction administration
20. Krayplan
21. Sector TPK

22. Territorial subdivision
23. Territorial subdivision with author's supervisory rights
24. General contractor
25. Territorial subdivision; division for TPK
26. TPK
27. Authorized commission of USSR Council of Ministers
28. Council of directors (consulting agency)
29. Interdepartmental commission of USSR Gosplan for TPK
30. Offices
31. General contractor for TPK and subcontractors
32. Board of directors of enterprises under construction
33. Sections, offices, divisions, bases, etc.
34. Industrial centers
35. Objects and organizations in centers.

For the primary TPK's one establishes an officially formed system of preplanning and planning documents, and the policy for their information support, development, expert evaluation and approval. The program for the formation and development of the TPK and the plans of the complexes includes directive and directed documents. Their indicators are coordinated in terms of the various assignments, resources, implementers and time periods with the corresponding divisions of the USSR State Plan and the branch and territorial plans.

The indicators for the primary TPK's for the next decade are included in the "Basic Directions for the Economic and Social Development of the USSR." Five-year and annual plans are included as an independent division in the plans for economic and social development of the country and are duplicated in the plans of the republics and oblasts. In the plans of the ministries, departments and oblasts (krays, ASSR's) the assignments for each primary TPK are singled out on a separate line and included in the consolidated indicators of the corresponding branch and territorial plans.

In order to create a TPK it is necessary to have both special management agencies in Moscow and locally and subdivisions in the existing agencies of branch and territorial management. They have the resources and bear complete responsibility for their decisions. The agencies of the higher level and their authorized representatives are delegated certain governmental functions and authority (see diagram above).

The combination of administrative, legal and economic principles comprises the basis of the interaction of participants in the creation of a TPK. It is necessary to have a system whereby the fulfillment of its functions would be advantageous to everyone. And it must be actually advantageous and not simply directly indicated.

The head organizations are officially established for each TPK: the general client (the USSR Gosplan); the general developer of the system and the program for the formation and development of the TPK (SOPS under the USSR Gosplan or on instructions from the USSR Gosplan--the scientific research institutes of the gosplans of the union republics or other scientific institutions); the general planner, and so forth.

The majority of the elements in the proposed system of management are to be found in the existing structure, but their activity is not sufficiently focused on the TPK.

This system of management agencies is intended for multipurpose TPK's that are complicated in structure and are being formed in poorly developed regions and areas of pioneer assimilation (the northern Ob', Sayansk, Bratsk-Ust-Ilimsk, lower Angara and others). In single-purpose TPK's (Southern Yakutiya in the first stage of its formation, the TPK on the basis of the KMA and so forth) the structure is simplified. The functions of the authorized representative of the commission of the Presidium of the USSR Council of Ministers are assigned to the deputy minister of the head branch whose authority is thus essentially increased and who is given direct contact with the corresponding commission of the Presidium of the USSR Council of Ministers.

"For" and "Against"

V. P. Mozhin: The idea of cooperation can only be welcomed, but are we ready for it? Now even representatives of a single branch, unfortunately, cannot cooperate in the production of products of local significance (forging, stamping and so forth). Perhaps with time this will be different, but so far the idea of cooperation, tempting as it is, arouses doubts.

Ye. I. Korenevskaya: B. Z. Mil'ner expressed an attractive idea, but it must be seriously broken down. What does a combination of funds mean now? Initially the corresponding parties sign protocols and then we know from experience, for example, of the Baltic republics, that up to 70 percent of them are violated--the higher department, for which this situation has changed, is unable to allot the funds.

Let us take the APK. It is granted significant rights, but the economic interests of the partners in the agroindustrial associations do not coincide. For example, the volume is planned in growth output for the Gossel'khoztekhnika and the bonuses depend directly on profit. It turns out that the more broken-down technical equipment there is, the more money is expended and the better it is for them.

Something similar can be observed in the TPK. For instance, when combining funds for joint construction the interests of the partners do not coincide: for some of them there is an additional land and for others there is a preferential right to utilization of the funds. A number of economic and legal problems arise and these impede the establishment of businesslike relations among the partners. Without the proper regulation of economic relations the proposed policy can hardly be effective.

B. Ya. Dvoskin: It is difficult to agree that the agencies for managing the TPK are needed only in the stage of its formation and the construction of complexes, and after this it would be possible to transfer these functions to someone and be satisfied with this. The TPK is a living organism. Frequently it is difficult to say exactly when the formation of the TPK ends. This is more like a continuous process: certain problems are solved and new ones

arise. The introduction of five GRES's and the transfer of energy to other regions of the country does not complete the development of the Ekibastuz Fuel and Energy Complex. There are weighty considerations for the creation of energy-intensive productions in Pavlodar and nearby oblasts and, on the basis of this, an essentially new specialization in the Kazakh SSR. We are speaking about the development of aluminum production, ferrous metallurgy, and so forth.

In our opinion, it is necessary to have a permanent agency for managing the TPK. Its functions and tasks could change, but it is wrong to limit it to the period of construction.

M. G. Kirichenko, doctor of jurisprudence, All-Union Scientific Research Institute of Soviet Legislation: As soon as the state agency is created the problem of its legal status, structure and mechanism of action will be solved. Without legal formulation and a good legal basis there is not a single agency that can simply exist.

Coordination councils.... How are they to be created? How can they be managed? Will they not be turned into yet another irresponsible level of authority which cannot be bypassed? And if only advisory agencies are created how is the TPK to be managed?

The agency for managing the TPK should have authority and should base its activity on the highly authoritative instructions of the USSR Council of Ministers, and then it will be able to actually coordinate, organize and introduce order.

V. A. Vityazeva, doctor of geographical sciences, rector of the Syktyvkar State University: There are various kinds of TPK's. The Western Siberian complex is one, the complex in Tajikistan is another, and there is still another in the Nenetskiy Autonomous Okrug. They began to create the Timano-Pechora TPK almost from nothing. And the forces of the soviets, the rayplan, and the rayon financial division corresponded. In the republic only 4 percent of the bookkeepers have a secondary education. What can the republic planning agencies do if they have toured only local industry--the food and dairy industry? At best they can gather data. Therefore, while recognizing the need to enlist the soviets in the administration of the TPK, I think it is necessary to remind ourselves of the personnel and personnel policy. Without this nothing can be done in the remote regions.

P. D. Podshivalenko: Today, for various reasons, the branches do not always use funds promptly and for their intended purposes when financing "their own" objects in the TPK. Would it be possible to keep these sums under effective bank control?

The limits on capital investments which comprise the plan for the TPK are generalized and developed, and then the allocations for capital investments are concentrated in the corresponding office of the Stroybank. Let us imagine that a head office has been opened for a specific TPK. It receives the plans for the capital investments of all branches of the given TPK and sends them to the local divisions that are financing the construction. The same thing can

be done with plans for financing. It is expedient to organize such offices for all TPK's and to grant them the corresponding rights. And the coordination councils could be permitted to keep 15-20 percent of the capital in investments for operational maneuvering.

B. N. Annenkov: The implementation of the idea of concentrating financial and credit funds on the construction of objects of the TPK will mean a changeover to centralized planning and management of the investment process on the scale of the TPK. This will inevitably require drawing up consolidated plans for financing capital investments for the complex. The Scientific Research and Finance Institute of the USSR Ministry of Finance has prepared proposals for the development of such plans.

The plans for financing capital investments for the TPK should reflect the branch composition and the territorial production structure (industrial units, groups and individual enterprises) of the complex, and it should be developed both for the 5-year and the 1-year periods. The consolidated plans for financing should envision in the form of divisions the plans for financing capital investments in the various groups of interconnected branches (basic specialization, specialization of auxiliary and service significance) depending on the peculiarities of the TPK. They will coordinate the interests of the associations, combines, enterprises and construction ministries with the general complex and regional ministries.

What Kind of Normative Act Should the TPK Have?

V. A. Pertsik: The practice of creating TPK's shows that from the first steps it is necessary to delimit clearly the authority, rights and responsibilities among the participants in their creation. Just as automotive traffic is impossible without rules, this delimitation is impossible without a certain legal mechanism. Of course the law alone will not solve all problems. The development of a system of management of the TPK is a complicated matter which requires the participation of various specialists. The selected conception of the system of management requires legal support. Only then will it be possible to eliminate the repeated mistakes and avoid "legal nihilism" that is inherent in various levels of the management hierarchy.

I recall that in spite of the various decisions, legally the TPK is still a blank spot. Only in the Constitution of the Tajik SSR are they discussed. What kind of legal document should there be for the TPK? Since the TPK is included as a constituent part of the state plans for the country's economic and social development which are approved by the USSR Supreme Soviet, their basic legal characteristics should be contained in a legislative document of the USSR. On the basis of articles 121 and 122 of the USSR Constitution, such a document cannot be an order from the Presidium of the USSR Supreme Soviet, but only a law, since we are speaking about immense budget funds for the creation and development of the TPK. In which should this be reflected? The basic tasks and principles for the formation of the TPK in the USSR, the concept of it, the governmental agency for managing it, and a list of the planned complexes.

It seems necessary to develop, moreover, free legal documents of a unionwide level which regulate relations in the process of the formation and functioning of the TPK; provisions concerning the TPK in the USSR and interbranch management of it (approved by the USSR Council of Ministers); and provisions concerning the Permanent Commission of the Presidium of the USSR Council of Ministers and provisions concerning the territorial agency of the USSR Council of Ministers. All these plans have been developed in fairly great detail.

N. S. Barabasheva, candidate of jurisprudence, Moscow State University: to rely only on cost accounting relations among participants in the TPK still does not mean to "go to the maximum." There is no doubt that one cannot ignore cost-accounting relations among the clients, builders and consumers. But with a large number of participants there is a greater danger of a departmental approach and local interests, for which a counterbalance is needed--an interbranch agency. It is necessary to search for the best ratio between administrative and economic methods of management.

It is extremely important for us lawyers to solve the problem of the administrative agreement. The outgrowth of this kind of agreement which have appeared in life are still very weak. They do not yet have the proper force and are not reinforced with means of legal coercion. It is necessary to legitimize the administrative agreement and give the soviets of people's deputies, management agencies and organizations the right to conclude them. Otherwise the problem of the responsibility of the participants in the TPK will be hanging in the air.

In interbranch management now responsibility "is not working." The discipline of the managers and the officials is enclosed within the branch and cannot serve as a guarantee of the observance of statewide, interbranch and territorial interests. As a result, party responsibility of the managers becomes decisively significant, but it cannot and should not replace responsibility along the state line.

It seems that the agency for management of the TPK should be given all the limits and capital investments allotted by various ministries and departments for construction of objects of the TPK, and only it should dispose of them as well as of the material and technical resources, wage funds, material incentive funds and funds for social and cultural needs. It seems that there is some point in increasing the role of this agency in solving personnel problems that pertain to managers and specialists of the branches. Only then will the agency for the management of the TPK be able to justify its existence.

I. L. Bachilo, doctor of jurisprudence, Institute of State and Law of the USSR Academy of Sciences: In spite of the obvious difficulties, it is necessary to strive to create an overall information model for the TPK. There are standard problems which require a one-time legal solution and the development of a unified methodological base for normative regulation of the TPK, including the group of problems that are generated by local conditions. The TPK is a permanent formation which exists as long as the ties among its participants are retained. And this means that the system of management and its legal

support are part of state management. Individualization of the mechanism of management is fraught with excessive outlays.

The Institute of State and Law of the USSR Academy of Sciences suggests developing a unified law for the organization of state management as a whole, which includes the fundamentals of various structures, including the TPK. The typology of organizational structures, the coordination of the areas of competence of various agencies, and the regulation of problems of resources on the basis of this law will make it possible to improve the system of management--to determine the requirements placed on committees and ministries. Special documents will formulate the legal status of the TPK and the role of its participants.

In any event the approach to the TPK should rely on a comprehensive target program. And the agencies for managing it should be formed on the basis of this. The corresponding development has been done in our institute.

Legal experts must take into account the diversity of ties in the TPK. This requires the development of new standard forms of the economic agreement. If the responsibility for the infrastructure or the construction are enclosed at the level of the territory, new relations arise among the branches and the territorial agencies.

Theory and Practice

B. Ya. Dvoskin: It seems that it is time to undertake a serious revision of the theory of the territorial production complex. In practice we have already accumulated enough that is in need of generalization.

B. N. Annenkov: It is clear to everyone that we cannot do without strengthening comprehensive planning. But how can this be done if there is no unanimity of opinions regarding the very concept of the TPK? Some regard it as a combination of purely industrial enterprises that are closely associated in the technology of production and the utilization of resources and the infrastructure on a particular territory. Others include in the complex auxiliary and service branches, right down to agricultural enterprises, material and technical supply, trade and consumer services. Therefore it is necessary to support the position of B. Ya. Dvoskin concerning deepening the theory of the TPK, and in order to strengthen the practice I would suggest creating a scientific and practical device which would present the modern theory of the formation and development of the TPK, the concept of its management, and the methodology for the development of comprehensive target programs, plans for economic and social development, capital investments, the startup of production capacities, planning and research work, financing capital investments, and material and financial balances of the TPK.

V. N. Lazhentsev, candidate of geographical sciences, Komi Branch of the USSR Academy of Sciences: When people speak of the TPK--and our "round table" is no exception--they inevitably touch upon two areas for improving management of them. The first combines the general issues of the theory of the TPK and the corresponding levels of management of regional development. The second pertains to the formation of newly created complexes when what comes to the

fore are the compiling and implementing of target programs for particular territories. Here people are speaking mainly about managing regional investment programs, including the distribution of orders for new technology and technical equipment.

Initially the theory of the TPK was one of the individual provisions in the overall theory of economic regionalizing. In the 1940s it was transformed into a relatively well-arranged system of the formation of territorial production complexes. The founders of the theory of the TPK were the academicians I. G. Aleksandrov and G. M. Krzhizhanovskiy, and a large contribution to its development was made by Prof N. N. Kolosovskiy. At the present time the sphere of scientific development of the TPK has expanded appreciably because of the legal, engineering, ecological and, one must especially emphasize, the politico-economic aspects of the distribution of productive forces.

Now the TPK is regarded not simply as an effective territorial combination of enterprises, but more profoundly--as a progressive form of collectivization of production whereby regional unity of productive forces assumes a directly social nature. If one may put it this way, we have here a normally contradictory process of the formation of territorial production complexes, with regional nuances, taking place everywhere on the basis of concentration, specialization, cooperation, combination and integration. All we need to do is clarify that integration is becoming statewide; the holders of the resources are not the collectivized unit of management, but the state as a whole in the form of its central and local agencies of authority. For the TPK in this sense, perhaps, no special agencies are needed, and all that is required is to improve the functions of state management.

It is another matter when speaking about the special, new, target-program TPK's, or, rather, about regional investment programs. Here one needs new approaches, new developments and new documents. This has been convincingly discussed at our "round table."

When speaking about the TPK we must not forget about improving the combination of branch and territorial planning. One observes a unique kind of paradox: the level of planning in the local areas, where the formation of the TPK has not yet been officially declared, is sometimes higher than in the regions where it has been officially formed. The oblasts, krays and ASSR's which have governmental decisions concerning the creation of the TPK seem to be waiting for special privileges, but at the same time they themselves do not devote sufficient attention to improving comprehensive economic and social planning and do not proceed further than planning the local economy. The advanced practice in comprehensive planning from Vladimir, Tomsk, Chelyabinsk, Sverdlovsk, Moscow and Leningrad oblasts is being disseminated slowly. This situation must be changed.

N. N. Kazanskiy, subdivision chief of the division for territorial planning of the USSR Gosplan: In our planning practice we deal with various TPK's and therefore I agree that it is necessary to have a clear idea of which complexes we are discussing. If we are speaking about planning the territorial organization of the business in general then various kinds of positive

experience have been accumulated here, and this has been noted in directive documents. One might mention Moscow, Leningrad, Vladimir and Sverdlovsk.

The 1970's were marked by the appearance of the so-called target-program complexes in newly assimilated regions. The decree of the CPSU Central Committee and the USSR Council of Ministers of 12 July 1979 made the USSR Gosplan responsible for the development (with the participation of the councils of ministers of the union republics, the ministries and departments of the USSR and the USSR Academy of Sciences) of programs for solving large regional problems. It was suggested that they draw up consolidated plans for capital construction of the complexes, and for the TPK's of Siberia and the Far East--that they form the main indicators for economic and social development.

The complexes appeared in the five-year plan for the first time under the 11th Five-Year Plan (eight TPK's), and they did not appear in the annual plans until 1983. In spite of such a small amount of experience, one can speak of positive results. What was the situation with respect to enlisting ministries and departments to participate in the TPK's previously? The plan was provided as a whole, but the territorial cross-section was put off until later.... Frequently it was taken out. The ministries transferred the funds from one object to another without even waiting for the next annual plan. Now as soon as the TPK has been drawn up and approved by the USSR Gosplan the ministries and departments do not have the right to make such changes.

Keeping the indicators for the development of the TPK on a separate line in state planning contributes to this. Moreover, during the process of drawing up planning indicators individual production and nonproduction objects are coordinated with each other and it is possible to look over not only the horizontal, but also the vertical ties, which makes it possible to reveal the production and technological units that are inadequate, to include additional new productions in the complex, and so forth. When bottlenecks are manifested in the process of preparing the draft of the plan for the TPK, new decisions are sought. For example, for the Western Siberian complex a decision was made to enlist extensively contracting organizations from other republics and cities.

How does one improve the work that has been started? It seems to me that it is necessary to devote constant attention--and I include scientists in this--to the preplanning stage. In long-range planning there is not enough strategy for the development of the TPK: clearly substantiated goals of the economic development of the regions that are being assimilated, recommendations for the utilization of new technical equipment and technology, the stages of assimilation, the supply of material resources, the development of construction bases, and the most important social measures. It is necessary to raise the level of the development of systems for formation and the drafts of plans for the TPK: to expand the system of indicators, to enlist republic and local planning agencies and to step up control over the fulfillment of the plans. Work is being done in this area. For example, the staff of authorized representatives of the USSR Gosplan is being reinforced in a number of economic regions. They participate in the development of proposals for the

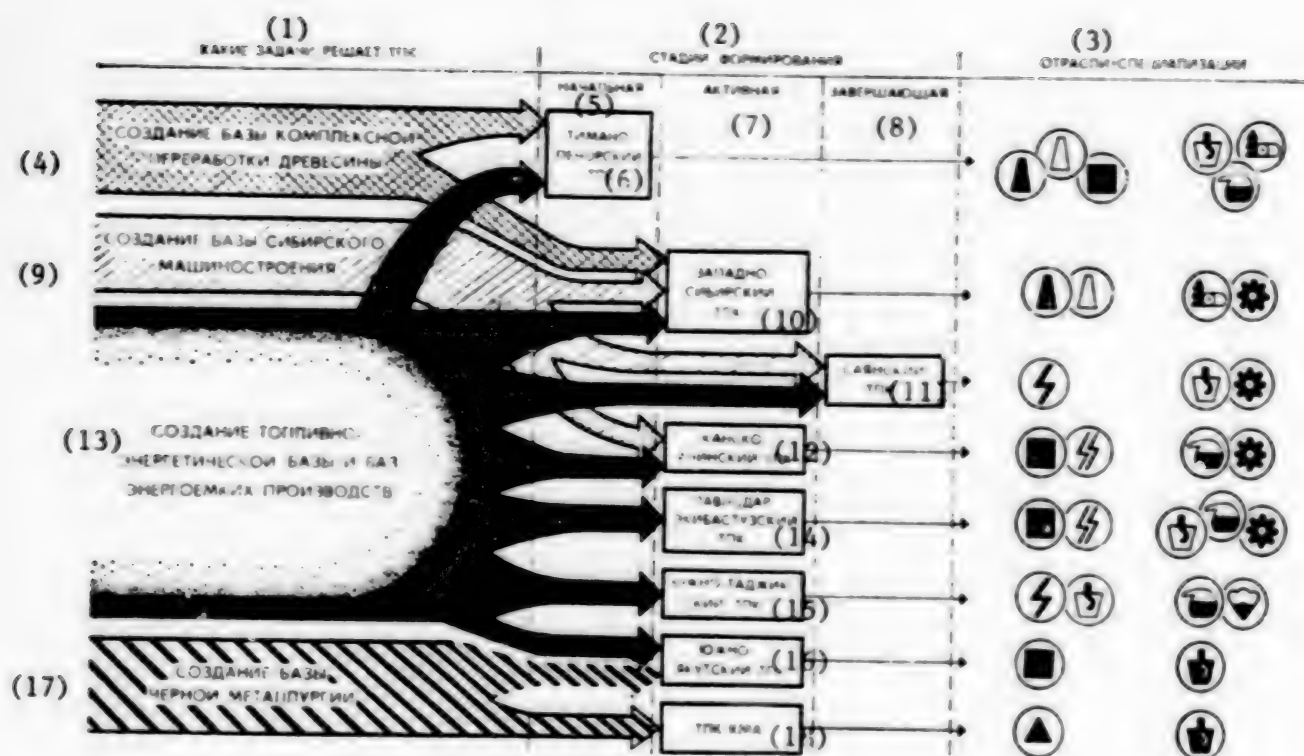
drafts of the plans for the TPK and check on the implementation of these plans.

Of course, in addition to improving planning (this was very keenly felt in our discussion) it is necessary to improve the management of the process of the formation of TPK's. My own personal point of view is that it is necessary to proceed along two paths. The first path is strengthening the management of planning. The second is improving interdepartmental interaction. It seems that there is no need for a special law, as some people suggest. One can take advantage of already existing experience of commissions of various ranks: for the BAM (USSR Council of Ministers) and the Western Siberian Commission (USSR Gosplan). But this is not necessary for all TPK's, but for those where these issues are very critical.

A Unified Approach Is Important

A. G. Aganbegyan: The overall approach which has been revealed at our "round table" seems very fruitful to me: to consider any problem not in and of itself, but within the framework of a system of a higher level. TPK's do not exist in a vacuum, and attempts to solve their problems alone, independent of our other problems, will hardly produce the necessary effect.

As a rule, TPK's are constituent parts of larger formations. In our institute we think that the development of these formations can and should be modeled as statewide regional programs. In Siberia it is necessary to have three of these programs--for the Western Siberian Petroleum and Gas Complex, the group of TPK's of the Angara-Yenisey region and the economic assimilation of the BAM zone. Then it will be inexpedient to regard the TPK as an independent formation. For instance, in the Angara-Yenisey region the strategy for the assimilation would consist in sequential changeover from the Irkutskaya GES to the Bratskaya to the Ust'-Ilinskaya, and from the Ust'-Ilinskaya to the Boguchanskaya. This would provide prospects for the construction workers, would make it possible to retain the collective, and organize construction in other newly assimilated regions.



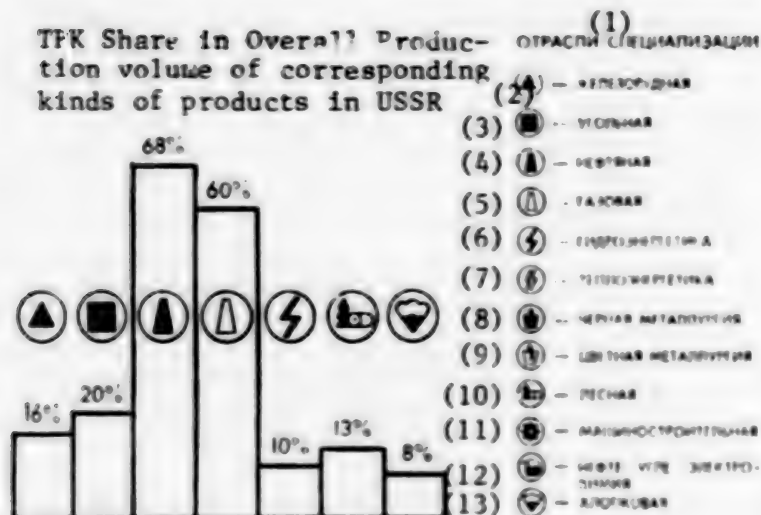
Share of TPK in Overall Volume of Production of Corresponding Kinds of Products (conventional symbols--see next diagram)

Key:

- | | |
|--|--|
| 1. Problems solved by the TPK | 10. Western Siberian TPK |
| 2. Stages of formation | 11. Sayansk TPK |
| 3. Branches of specialization | 12. Kansk-Achinsk TPK |
| 4. Creation of base for comprehensive processing of timber | 13. Creation of fuel and energy base and bases for energy-intensive industries |
| 5. Initial | 14. Pavlodar-Ekibastuz TPK |
| 6. Timano-Pechora TPK | 15. Southern Tajik TPK |
| 7. Active | 16. Southern Yakut TPK |
| 8. Final | 17. Creation of base for ferrous metallurgy |
| 9. Creation of base for Siberian machine building | 18. KMA TPK |

Now we are approaching the Western Siberian and the Sayansk complexes in the same way, and they are simply not comparable. The Western Siberian Petroleum and Gas Complex is a totality of TPK's: the Central Ob', Northern Ob' and the largest, the Tyumen-Tobolsk Petrochemical and Machine-Building Complex.

Proposed Structure of Management of TPK



Key:

- | | |
|-------------------------------|---|
| 1. Branches of specialization | 8. Ferrous metallurgy |
| 2. Railroad | 9. Nonferrous metallurgy |
| 3. Coal | 10. Timber |
| 4. Petroleum | 11. Machine building |
| 5. Gas | 12. Petroleum coal and electrochemistry |
| 6. Hydraulic energy | 13. Cotton |
| 7. Thermal energy | |

The changeover to the statewide regional program requires the corresponding system of management. For instance, for the Angara-Yenisey region it would be expedient to have a commission of the USSR Council of Ministers with the authority of the rank of minister and deputy in each TPK. The commission should have the opportunity to conduct a unified policy for a group of interconnected TPK's. Under this should come the planning, projections and other components of management.

A good deal can be said about the inadequacy of the existing system of planning. The TPK means forming a complex from various branches, a unified production and social infrastructure, and a common approach to the base of construction, the system of settlement, environmental protection and so forth. Forming complexes produces a large economic and social effect. But how does one achieve this in the socialist economy? Only with the help of a long-range plan. There is no other method. The modern-day disproportions originated 10-15 years ago. A well-substantiated long-range territorial plan could help to avoid these.

The five-year plan--with or without a long-range plan--is a plan of varied quality. In and of itself the five-year plan is completely inadequate for a TPK. Let us imagine that for a specific TPK a large-scale program has been

adopted in the form of a decree of the directive agencies. It has clearly formulated the goals, set the concrete tasks and allotted resources for their implementation, and established which ministry will produce what, how much currency has been allotted for purchasing foreign equipment, what new organizations will be created and how the old ones will be reoriented. This document would be immeasurably more effective than the current plan.

Improvement of the management of the TPK places on the agenda the development of a large group of various kinds of problems. In our institute we think that the territorial division of Siberia that has been adopted still does not meet the requirements of the day. We need consolidated krays in which it is possible to create serious planning commissions numbering 200 people as in the union republics, and solid zonal institutes under them.

Problems of planning and management of the TPK cannot be solved without reinforcing the economic mechanism, strengthening economic levers and stimuli, and improving financing and credit. There is an immense field for work here. Unfortunately, up to this point our natural resources have not been evaluated economically. The forests that were flooded with the construction of certain GES's are a problem primarily of economic evaluation of the natural resources in the TPK. So it is necessary to deepen not only the theory of the TPK itself, but also related scientific problems.

What is the period of effect of the agencies for management of the TPK? The complexes are created for more than one five-year plan and the agencies are necessary for all of this time. And what will happen with an already formed complex and with the enterprises that are being put into operation when the complex as a home no longer exists? They must be included in ordinary economic life, and as for the entire complex, it is necessary to check and make sure that it remains.... One would think that the question could be resolved in the process of the accumulation of experience.

I agree that it is necessary to have a law concerning the TPK and that the social infrastructure, housing and so forth should be transferred to the local agencies. But to do this it is necessary to create very serious material and technical prerequisites and to raise the status of the soviets. The Bratskaya GES has long been trying to turn the housing over to the ispolkom, but the ispolkom does not want to be responsible for it. The same thing is happening in Nizhnevartovsk. The Magnitogorsk Combine cannot turn over to the ispolkom communications and the trolley in the city.

The role of local agencies in social and cultural construction should be sharply increased, allotting special-purpose funds and creating specialized agencies and the corresponding base. The social problems are complicated and serious attention must be devoted to them.

In conclusion I wish to note that in any event we are moving forward in the area of the TPK: they have become objects of planning. Even 15 years ago the complexes were not mentioned in the directive documents. Then they were discussed in the decisions of the congresses and finally they became objects of planning. Now the corresponding divisions are being reinforced in the

Gosplan. A commission has been created for the Tyumen Complex. There is progress. But there is still much to do.

Conclusion. Let Us Sum Up the Results

The discussion at the "round table" has shown the great complexity of constructing a system for managing the TPK. Modern complexes are a relatively new object in our national economy. Therefore there are also a large number of viewpoints on the problem; but regardless of how different they may appear at first glance, one can determine more or less definite positions. The target-program approach makes it possible to propose a well-arranged system of preplanning and planning documents, to outline the organizational structure of management and to envision the functions of its participants without rigid limitations on methods. The latter can be flexibly combined, depending on the specific features of the TPK's, the importance of the tasks, the preparedness of the participants, and the level of solutions to more general problems (the combination of territorial and branch management, the economic mechanism).

The target-program approach provides a good basis for legal regulation of the system of management of the TPK.

What is needed now is intensive discussion of the existing proposals, and these proposals have been developed by various organizations, particularly in conjunction with the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences, the All-Union Institute of Soviet Legislation of the USSR Ministry of Justice, and the SOPS under the USSR Gosplan.

Proposals regarding the management of the TPK should be coordinated with the overall principles for improvement of the economic mechanism and be taken into account when it is developed. The contiguity of the problem of managing the TPK and the overall improvement of the economic mechanism and other circumstances can make the changeover to the best system for the TPK complicated and make it necessary to be carried out in stages. And here probably the most important thing is not to put off that time when it will be possible to speak about the system for management of the TPK in the words of one of the participants in the "round table" discussion: "It has been created to the maximum."

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PREHISTORY OF TPK TRACED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 90-91

[Article: "From the GOELRO to Our Day"]

[Text] Even in the plan for the GOELRO [State Plan for the Electrification of Russia] one can see features of the TPK which have been manifested with increasing force subsequently, throughout the course of our economic development.

The plan for the GOELRO was based on the idea of priority development of individual regions with the greatest prospects, relying on advanced technology, which at the time involved extensive utilization of electric energy. The energy base of these regions was determined by large state regional electric power systems--GRES. They were planned along with the group of industries that were the consumers of the energy.

Under the 1st and 2nd five-year plans they proceeded directly from the general provisions concerning the country's development to the TPK. These two plans were distinguished by in-depth development of territorial problems and ways of solving them. For example, in the 1st Five-Year Plan it is written: "The objects of planning are the industrial complex on the basis of the Dneprovskaya GES," that is, it envisions the development of a complex (and not a territory) which included an energy base (Dneproges), an aluminum plant and a plant for producing titanium. When developing the 1st and 2nd five-year plans they carefully determined the prospects for the development of complexes and the readiness of the national economy for their realization. The corresponding entries in them pertained to various stages in the preparation: to create a complex on the basis of Dneproges, to begin the formation of the Uralo-Kuznetsk Combine and to develop proposals for comprehensive utilization of the water resources of the Angara and Yenisey. It was envisioned that the complexes should become the basis for both economic regionalization and administrative division of the country.

During the years of the 3rd Five-Year Plan, the Great Patriotic War and subsequent five-year plans the branch principle of management prevailed. The practice of forming special areas for the development of productive forces was limited typically to branch objects (Norilsk).

The 1950's and 1960's were marked by essential progress in the theoretical and practical areas. An article was published by the eminent scientist and practical worker, N. N. Kolosovskiy, "Industrial-Territorial Combination (Complex) in Soviet Economic Geography,"¹ which is still significant today. Work was renewed under large plans for the utilization of the Volga, Angara and Yenisey. Since these objects appeared to be extremely costly, the planners began to look for companions. Thus there appeared a natural need to develop comprehensive plans and to create a unified infrastructure and construction base. Giprogor and Gidroyekt were enlisted in this work. Through their efforts the work for regional planning was transformed into a new planning stage of justification of the effectiveness of distributing the totality of enterprises on a particular territory. Moreover, the Gosplan began to prepare and then to draw up the general plans for the USSR. The now well-known abbreviation TPK began to appear in these developments. During these same years a decree was issued concerning the formation of Bratskgesstroy which was made responsible for the construction not only of the GES, but also facilities of other branches.

At the 24th Party Congress the TPK was named in the official documents. It began to be included in the directives of the conferences: for the 9th Five-Year Plan--12 TPK's, the 10th--10 of them and the 11th--eight of them. Beginning with the 11th Five-Year Plan the TPK's will be singled out as independent objects in the national economic plans.

FOOTNOTE

1. VOPROSY GEOGRASII, 1947, issue 6, pp 133-168.

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SOUTHERN TAJIK TPK SHARES EXPERIENCE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 91-100

[Article by G. I. Tikhonov, member of the board of the USSR Ministry of Power and Electrification, chief of the Soyuzgidroenergostroy Association (Moscow): "The Southern Tajik TPK: Experience, Problems, Suggestions"]

[Text] The formation of the Southern Tajik Territorial Production Complex began in the 1960's when the construction was being completed on the cascade of the Varzobskaya GES and the Dushanbinskaya TETs. The concentration on relatively small territory of unique supplies of electric energy and considerable mineral-raw material and labor resources in combination with the favorable climatic conditions as well as the existing material and technical base--these are the main prerequisites for the creation of a complex.

At first there was to be goal-directed development of all objects of the Southern Tajik National Economic Complex for the period up to 1990. The title list for the construction of the facilities for production purposes of the Southern Tajik TPK for the 9th Five-Year Plan envisioned intercoordinated time periods for the startup of capacities and the necessary capital investments. This meant coordination of the investment policy among the various ministries within the framework of the complex.

But the reality turned out to be different. Investments in the main objects of the complex (for instance, in nonferrous metallurgy and the chemical industry) were planned without taking into account comprehensive buildup of the region. Contracting organizations of various ministries and departments did the construction work. And while some of them (the Tadzhikgidroenergostroy Trust of the USSR Ministry of Power and Electrification) were not loaded to full capacity because of the lack of financing, others (the Tadzhikkhimstroy Trust of the Tajik SSR Ministry of Construction) had not even assimilated those separate funds that had been allotted to them. The objects of the infrastructure were not fully constructed, the enterprises of the construction materials and construction industry did not have sufficient capacity, and in individual departments they did not even have enough skilled personnel. As a result, although the title list was profoundly developed (in particular, the Institute of Economics and Mathematical Methods of Planning of the Tajik SSR Gosplan drew up a network

investment model) and was coordinated with the corresponding ministries, they did not manage to carry out the construction program that was earmarked for the 9th Five-Year Plan. Only the USSR Ministry of Power and Electrification assimilated the investments according to the established title list. For the construction of the aluminum plant they allotted 29 million rubles less than was planned, and the Yavan Electrochemical Plant--27 million rubles less. Because of the delay in the startup of the power transmission line between Nurek and the Syr-dar'inskaya GRES, the aggregates of the Nurekskaya GES frequently stood idle. Their utilization did not exceed 30-50 percent. Up until 1980 some of the water from the Nurek water reservoir was discharged as waste. Such was the payment for a narrow departmental approach to the creation of a complex.

The construction of the Tajik aluminum plant did not go well either. It was to have been one of the main consumers of energy from the Nurekskaya GES. The beginning of its construction was planned for 1965. During the first 2 years they assimilated 2.5 and 3 million rubles' worth of construction and installation work. In order to construct the plant the organization was transferred from the Golovnaya GES on the Vakhsh to the city of Regar. But as early as 1967-1968 the USSR Ministry of Nonferrous Metallurgy reduced the volumes of work (1.5 and 1.2 million rubles, respectively). Funds were not allotted for the construction of housing up until 1971. During this period the collective of builders had practically disintegrated and therefore when increasing the volumes of work in 1974-1975 to 33 million rubles a year, it was necessary to create the collective anew. When the Tajik aluminum plant was constructed all of the annual plans were adjusted. And if such shortcomings in the planning for the construction of the Nurekskaya GES were somehow compensated for through the efforts of a single client and the contractor (the USSR Ministry of Power and Electrification), in the construction of the aluminum plant they were exacerbated by the client--the USSR Ministry of Nonferrous Metallurgy, which changed the plan for industrial and housing construction on the basis of departmental interests. As a result, the financing of the construction was put off for several years and was not provided until June-September of this year.

The Yavan Electrochemical Combine includes productions of the unified technological complex and the TETs. Its construction was planned for the 8th and 9th five-year plans with simultaneous introduction of production and energy capacities. In 1969 the first aggregates of the TETs was introduced. But not one of the objects of the combine for which the thermal capacities of the TETs were intended had been introduced. As a result, the TETs worked for 8 years under the uneconomical condensation schedule. Although the USSR Gosplan improved a comprehensive title list for 1971-1975 for efficient planning of objects of the TPK, for the aforementioned reasons not a single one of the client ministries carried it out. The situation was repeated under the 10th Five-Year Plan as well. Moreover, up to this point the Gosplan of the Tajik SSR and the Division for Territorial Planning of the USSR Gosplan have not come to a unanimous opinion concerning the composition of this TPK.



Southern Tajik Complex

Key:

- | | |
|-------------------------|-------------------------|
| 1. Varzobskiye | 12. Shaartuz |
| 2. Tursunzade | 13. Petroleum |
| 3. Dushanbe | 14. Gas |
| 4. Yavan | 15. Hydraulic energy |
| 5. Rogunskaya | 16. Ferrous metallurgy |
| 6. Nurekskaya | 17. Machine building |
| 7. imeni L. I. Brezhnev | 18. Electrochemistry |
| 8. Baypazinskaya | 19. Light |
| 9. Kupyab | 20. Food |
| 10. Kurgan Tyube | 21. Glass and porcelain |
| 11. Kopkhozabad | |

One-Man Management Is Required

The existing regional and departmental agencies cannot manage the territorial production complex, which is an interdepartmental structure on a regional basis. A single agency should manage the formation and construction of the complex and be completely responsible for it.

Certain features of this agency are already determined by practice. Many construction organizations draw up orders, utilize the capital that has been allotted, order blueprints, in other words, perform some of the functions of the client. For a long time the Tadzhikgidroenergostroy Trust in conjunction with the client has been realizing the capital for the equipment for construction projects of Tadzhikglavenergo. For it the delivery dates are less frequently missed than for other objects.

Plans for financing Tadzhikglavenergo are drawn up on the basis of calculations of the Tadzhikgidroenergostroy Trust. This trust participated,

along with the Tajik SSR Gosplan, in drawing up the comprehensive title list for construction. This kind of cooperation made it possible to successfully complete the startup of the Norekskaya GES, in spite of the shortcomings in the financing of construction, particularly the repeated adjustment of the estimates. The consolidated estimate was reapproved eight times during the construction, and if one is to take into account the changes in the limits of the approved estimates, it becomes clear that in many stages of construction there was no possibility of actual scientifically substantiated planning of construction and installation work. Changes in the cost of construction made it necessary for the Ministry of Power and Electrification and the USSR Gosplan to adjust the title lists for construction in the five-year plans as well.

The unified agency for managing the TPK should combine several functions of contracting constructing organizations and clients and actively influence the structure of the construction sites, the sequence and the time period for the introduction of objects in the complex. It should be given the right to order the development of comprehensive preplanning decisions; to order and partially carry out planning documentation; to realize and distribute financial funds and funds for equipment; to prepare suggestions for changing the set of objects, their structure and even the set of technologies and products that are produced if this is required by economic expediency and the needs of other departments. Let us call such an agency an association for formation and construction of the TPK (OFIS TPK).

The tasks for the formation of the complex are dynamic. They can be carried out at various times by various departments. The composition of the participants in the creation of the TPK is not always the same. This is a kind of a shareholding society whose permanent members are organizations engaged in the formation and construction, and temporary members are the client departments. The latter allot the necessary financial means and funds for material and equipment, they deliver nonstandard equipment and they perform special and installation work on orders from the general contractor.

The experience of the shareholding societies that have existed in individual stages of economic construction in our country suggests concrete organizational forms of management. One can refer to the AMO Shareholding Society and the Shareholding Society for Railroads which at one time was headed by F. E. Dzerzhinskiy. It seems that the new shareholding society should include the OFIS TPK, the union and republic ministries, and various departments and territorial management agencies. The activity of the OFIS TPK is directed by the USSR Council of Ministers. It also appoints the chairmen of the central management agency--the general council of the OFIS.

The OFIS TPK operates on a cost-accounting [khosraschet] basis using funds envisioned in the plans and estimates for the construction and maintenance of the directors of the enterprises that are under construction. The new provisions concerning the allotment of capital investments to the ministries and departments for the planned growth of the volumes of production enable the shareholding ministry to transfer the appropriate share of allotted funds to the OFIS in the form of a credit payment. As a result the OFIS will be able to concentrate forces and funds on the most rapid completion of objects

necessary to the national economy and to improve the quality of construction. Being the client for equipment and materials, and the OFIS will be able to stabilize the annual and five-year plans, to balance material, labor and financial resources, and to better determine and regulate the capacities of the construction and installation organizations that have been enlisted for constructing objects of the TPK. The client ministries will be relieved of functions having to do with construction management which are not properly theirs and will be able to concentrate their efforts directly on providing the national economy with the necessary products.

The change in the technology for construction production and the appearance of new materials and new technical equipment require systematic adjustment of the plans and changes in the drafts of the plans within the framework of the unified program.

The tasks facing the TPK change with time. This is related to the expansion of the boundaries of the complex. In the first stage it was suggested that they assimilate the resources of the Vakhsh River alone. Subsequently it was recognized as expedient to assimilate the hydraulic energy resources not only of the Vakhsh but also of the Pyandzh and their tributaries. Therefore the complex should include practically all of Southern Tajikistan and some of the Gorno-Badakhshan Autonomous Oblast.

Efficient utilization of the LEP's that connect the Norekskaya GES with the energy system of Central Asia required the creation near the GES of a large consumer of electric energy--the Tajik aluminum plant, which is being constructed in Tursunzadevskiy Rayon. And this rayon, consequently, is included in the TPK. One of the tasks of the complex is the utilization of significant supplies of cooking salt in Yavanskiy Rayon for the production of chemical products containing chlorine. This region contains one of the main objects of the TPK--the Yavan Electrochemical Combine.

The city of Ordzhonikidzeabad and the adjacent regions turned out to be in the center of the main shipments of cargo for the construction of the TPK. Industrial bases and warehouses were constructed here and construction-installation organizations and those that serve construction were also placed here. Therefore this region organically merged with the TPK. The territory of Gissarskiy and Leninskiy rayons join the complex into one. Additionally, these rayons provide most of the labor force. Thus their place in the complex is determined.

The new tasks expand the boundaries of the TPK correspondingly. The construction of a GES in the lower course of the Pyandzh will require including the TPK Kulyab and Kurgan-Tyube oblasts, and the assimilation of its central and upper reaches--the northwestern part of Gorno-Badakhshan Autonomous Oblast.

The natural resources of the Southern Tajik TPK are not limited to cooking salt and hydraulic energy. The supplies of turpine cyanites will be raw material for the production of aluminum in the future. A study of the need for materials and items can suggest ways of nontraditional utilization of

aluminum and items of the Yavan Electrochemical Combine which, in turn, will require the creation of new enterprises in the complex.

Thus the structure of the complex and its limits are not given once and for all, but change in keeping with the new tasks. Therefore the OFIS must reveal the future structure of the TPK: select enterprises that perform the basic task of the complex and plans that comprehensively utilize raw material, energy and wastes from production, and also objects of the infrastructure, and prepare the new outlines for the formation of the complex with the volume of work, the time periods for its fulfillment and the sources of financing, which will serve as a basis for the economic plans for the development of the TPK.

The financing of each subsequent section of the complex should be determined before the completion of the construction of the first object of the preceding section. The continuity of the experience and the arranged production ties will make it possible to utilize the capacities of the construction organizations efficiently.

The Structure of the OFIS

In the first stages of the creation of the TPK the USSR Gosplan and the corresponding union republic select the region of the GPK and its basic specialization. In subsequent stages there practically is no unified management of the formation since the departmental agencies (clients or contractors) solve only concrete problems of the productions under their jurisdiction. Therefore the OFIS must be created immediately before the beginning of the construction. It will also take on the functions of the general contractor, the general client and the general planner, thus solving all problems related to the formation, construction and social development of productions of the complex.

The OFIS will have to solve the following groups of problems:

determination of the structure of the complex and the dynamics of its development;

selection of the technical and economic decisions for the complex;

startup of capacities within the established time period;

supply of the construction with the necessary material and technical resources, equipment and personnel;

creation of the infrastructure.

The first group of problems is solved with the help of a unified target program and schemata for the development of the complex for the given time (five-year period). The TEO of each section of development and regular refinements of previously adopted decisions are compiled on the basis of the cadastre of changes. The OFIS must have a scientific research subdivision which is capable of determining the best paths for further development of the complex.

When solving the second group of problems the initial forms should be the TEO and the technical (working) plans for the objects as a whole, and the blueprints for the volume of construction for subsequent years. They will be developed by the OSIF. It will also provide expert evaluations of the drafts and control over their implementation. To do this it will have to have a planning subdivision which develops the TEO's and fulfills and orders plans for the facilities.

In our opinion the solution to the first and second group of problems could be expediently entrusted to a subdivision of the OFIS--a regional interbranch scientific research and planning institute (RMNIPi). A model structure of this institute is given in Fig. 1, and its position in the overall structure of the OFIS--in Fig. 2.

The tasks of the third group are preceded by the construction and are culminated with the release of the facilities for operation. Therefore the OFIS should include both construction enterprises which could easily be combined into a regional interdepartmental construction complex (RMSK) and a board of directors for the enterprises under construction.

Objects of the infrastructure are constructed by construction administrations which create the main industrial objects or specialized subdivisions. These subdivisions can be taken from the regional construction complex (see Fig. 2). The structure of the latter can be analogous to the structure of the general construction trusts, with the exception of enterprises of the construction industry and the UPPK (administrations for production and technical staffing) which are singled out into independent subdivisions or are directly under the jurisdiction of the OFIS. They carry out the fourth group of tasks.

Included in the OFIS is the dispatcher service which is created following the model of the operational dispatcher services of the USSR Ministry of Power and Electrification. The planning and distribution documents of the dispatcher service are prepared by the computer center and it also monitors the fulfillment of plans and schedules and adjusts the latter documentation for the achievement of the given results within the necessary time periods.



Figure 1. Structure of Regional Interbranch Scientific Research and Planning Institute (RMNIPI).

Key:

- | | |
|--|--|
| 1. RMNIPI director | 8. Division for expert evaluation of plans |
| 2. Economic services | 9. Division for expert evaluation of estimates |
| 3. Financial management services | 10. Planning divisions |
| 4. Head engineer | 11. Experimental plant |
| 5. Division of plans and long-range research | 12. Computer center |
| 6. Design bureau | 13. Groups for authors' supervision at construction projects |
| 7. Division of plans for organization and production (POR and PPR) | |

The OFIS also includes the service for preparing management decisions, which consists of highly qualified experts. It checks on the substantiation of the decisions that are suggested.



Figure 2. Structure of Association for Formation and Construction of TPK (OFIS)

Key:

- | | |
|---|--|
| 1. Authorized Representative of USSR Council of Ministers, General Director of OFIS | 6. RMSK |
| 2. Deputy general director for formation of TPK | 7. UPTK |
| 3. Deputy general director for construction--head engineer | 8. Plants for reinforced concrete items and construction parts |
| 4. Service for preparing management decisions | 9. Head dispatcher |
| 5. Unified directorate of enterprises under construction | 10. RMNIPI |
| | 11. Deputy head engineer for forming the infrastructure |
| | 12. Experimental plant |
| | 13. Housing construction |
| | 14. DSK |

The experiment in creating the OFIS has already actually begun. The combination of the functions of the client and the contractor in one organization and the preparation for drawing up a unified target program have already been tested in practice. When constructing the Baypazinskaya GES,

which is included in the Southern Tajik TPK, the Tadzhikgidroenergostroy Trust acts as the client. The facility is to be released after the completion of all the work and after the planned capacity is on line. The experiment as a whole is taking place successfully. The construction workers have made a decision to put the GES into operation a year ahead of the earmarked deadline. The plans for construction and installation work are being fulfilled by 110-120 percent, and the savings on the introduction of the proposals of the construction workers have exceeded 4 million rubles.

It should be noted that the Institute of Economics and Mathematical Methods of Planning of the Tajik SSR Gosplan has drawn up a model of the comprehensive target program for the formation of the Southern Tajik TPK. If these calculations are continued taking into account the conditions of the preceding period this model can be used for current and long-range planning of the activity of the OFIS of the given TPK. After the "Schema for the Formation and Development of the Southern Tajik TPK During the Period Up to 1990" it is necessary to develop a long-term target comprehensive territorial program which will determine the direction and succession of the formation of the complex which is included in the state plan for the country's socioeconomic development.

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WAYS OF INCREASING LABOR PRODUCTIVITY RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 102-116

[Article by Sh. B. Sverdlik, candidate of economic sciences, department chief of the Novosibirsk Institute of the National Economy: "Labor Productivity and Its Payment, Thoughts About Statistics"]

[Text] An efficient ratio between the increase in the payment for labor and the productivity of labor is one of the cornerstones of the theory of socialist reproduction. In the decree of the August (1924) Plenum of the Central Committee of the Russian Communist Party (of Bolsheviks), "On the Wage Policy," it is pointed out that "...the increase in labor productivity must outstrip the increase in wages. Only under this condition will a material base be created and funds be accumulated both for providing for increased wages and for expanding production."¹ The party is constantly devoting attention to the need to coordinate the dynamics of wages and labor productivity: "We have revealed quite definitely the inadmissibility of violating the objective economic requirement of more rapid growth of labor productivity. Unless it is closely connected with this decisive factor an increase in wages, which produces quite a favorable impression initially, in the end will inevitably turn out to be a negative influence on all of economic life. In particular, it gives rise to demands which cannot be fully satisfied with the given level of production and makes it difficult to eliminate the shortages with all of the distorting consequences, which evoke the justified indignation of the workers."²

One can say that in wages as in no other economic category are focused the interests of the society, individual collectives and workers. Public interests dictate the need to observe strict proportions between the growth of the wage fund and the sale of goods and services to the population. The commodity and monetary balance of the consumer market is one of the key conditions for effective implementation of socioeconomic tasks by the system of wages--the formation of material and spiritual needs of the society, the elevation of the skill-professional and cultural-technical level of the workers, and the stimulation of growth of the productivity of public labor.

The collectives of the associations and enterprises and the management of the ministries and departments understand, of course, that balancing wages and

commodity resources is good and not balancing them is bad, but at the lower levels of the hierarchical system of management of production the collective interests frequently overshadow the national economic ones. And not only because one still encounters unconscientious managers and workers who are ready to take more from the national income and give less (although this does happen). The fact is that individual collectives simply do not have (and cannot have) complete information necessary for evaluating the balance of monetary circulation and, consequently, the permissible growth of wages. In their planning calculations they are oriented toward the practice of past years and toward the indicators of other enterprises. If it is not explained to the workers why at a related or neighboring enterprise the average wages are increasing more rapidly, their first reaction is to apply for dismissal (at their own request." The threat of stoppages because of the lack of workers forces the economic managers to add to the wage fund, and sometimes to increase the planned normative.

The associations and enterprises need stable normatives of the ratios between productivity and wages, but they themselves cannot construct them. The ratio between productivity and wages, being related to the entire system of national economic proportions, is a purely centralized indicator, and it should be planned from above to below. First of all one determines the efficient relationship on the scale of the national economy. It provides for balance of monetary incomes of the population with commodity coverage. Then it is differentiated for the various stages of the hierarchical structure since its goals and tasks are inherent in one level of this or another.

The National Economic Level

In calculating the efficient relationship between the rates of growth of labor productivity and the average wages, that is, the changes in the proportion of the wage fund in the national income, it is necessary to take into account the entire range of factors in the commodity-monetary balance of the consumer market. Among these are redistribution of primary incomes of the workers and the enterprises through channels of the nonproduction sphere and the financial system, the dynamics of the cash monetary and noncash savings of the population, export-import operations, and a number of other things.³ But the main thing is the change in the proportion of retail commodity turnover in the utilized national income or, which is the same thing, the ratio between the growth rates of these two indicators.

Report indicators are more weakly correlated. During the years of the 9th and 10th five-year plans the ratios K_1 and K_2 turned out to be higher than planned with a clear tendency toward an increase in the difference to the advantage of K_1 . The assignment for increasing the proportion of retail commodity turnover in the utilized national income during 1981-1983 was not fulfilled, which reduced the effectiveness of measures directed toward coordinating the growth of productivity and of wages. The wage fund for the national economy increased during 3 years of the five-year plan by 11.2 percent, and retail commodity turnover--by 6.8 percent. The unity of the triad of productivity, consumption and wages was violated; as a result the increase in the monetary incomes of the population is divided approximately in half between the increase in purchases in retail trade and deposits in savings banks.

Table 1

	1971-1975		1976-1980		1981-1985	
	<u>Plan</u>	<u>Report</u>	<u>Plan</u>	<u>Report</u>	<u>Plan</u>	<u>Expected Fulfillment</u>
Ratio of growth rates:						
Average wages of works and employees and productivity of public labor (K_1)	0.66	0.78	0.68	0.93	0.81	0.75
Retail commodity turnover and national income used for consumption and accumulation (K_2)	1.09	1.29	1.11	1.17	1.28	1.14

Planning indicators are calculated according to assignments of five-year plans, report figures--from the collection: "The USSR National Economy in 1983. USSR Central Statistical Administration on the Results of the Fulfillment of the State Plan in 1984," PRAVDA, 29 November 1984.

According to preliminary data, the relationship between the rates of increase in retail commodity turnover and the national income increased from 1.45 in 1984 to 1.49 in the final year of the five-year plan. As Comrade K. U. Chernenko pointed out at a meeting of the Politburo of the CPSU Central Committee on 15 November 1984, positive strides in the economy which have marked the past 2 years should not only be reinforced, but also multiplied.⁴

The observance of the planned ratio between the rates of growth of labor productivity and wages in and of itself does not guarantee balanced monetary circulation. Increased productivity creates only objective conditions for increasing the mass of goods and services for consumer purposes, which makes it possible to increase the average wages. But the growth of consumption does not depend at all proportionally on labor productivity: the interconnection between these two indicators changes essentially depending on what goods arrive on the store counters. During the years of the 9th and 10th Five-Year Plans for a 1 percent increase in the productivity of public labor there was an approximately 1.4 percent increase in retail commodity turnover, and during the 3 years of the current five-year plan--only 0.7 percent.⁵

In the area under consideration the program requirement of the party--all in the name of man, all for the good of man--turns into a necessary condition: not growth of monetary incomes in and of itself, but goods and services in keeping with the needs of the workers. And an increase in the mass of goods and services for consumer purposes requires immense efforts involved in restructuring the production apparatus and improving the economic mechanism and the system of evaluations of the results of production activity. Therefore a primary task of planning calculations is to determine the volumes of goods and services that correspond to the demand of the population in

keeping with the assortment, quality and prices, and to allot resources for the production.

Pay attention. Only after the quantity of goods and services for sale to the population becomes known is it possible to change over to the second stage of calculations--the determination of the wage fund and the ratios between productivity and the average wages for the national economy and for the various branches and regions. There is a difference sequence for the sequence of planning: from monetary incomes--to commodity support for them. After planning the growth of the wages and other incomes one determines the buying funds, that is, the sum of monetary funds which the population has at its disposal and intends to use for the acquisition of goods. After this one determines the amount of retail commodity turnover. And only in the last stage is an attempt made to provide for actual commodity coverage of the calculated amount of retail commodity turnover with concrete commodity resources.

An idealized picture of the direct subordination of purchasing funds of the population to their monetary incomes sometimes leads to a formal commodity-monetary balance of the consumer market. Industrial enterprises are given additional assignments for producing consumer goods and trade is given additional assignments for retail commodity turnover. Everything goes smoothly on paper. But there is no demand for the goods that are sent for retail commodity turnover. In 1984 because of a failure to meet the demand trading agencies refused to purchase at the wholesale trade fair 500,000 television sets, 115,000 radios, almost 250,000 cameras, 160,000 refrigerators and other goods, and they left in the warehouses 300 million electric light bulbs, 17 million watches and so forth.⁶

Above-normative residuals in trade are estimated in the many billions of rubles.

It seems that the imperfect logic of planning retail commodity turnover according to the principle of "monetary income--goods" is one of the radical reasons why the growth rates lag behind the assignments of the state plan (Table 2).

The multitude of prices and the methods for measuring products also contribute their bit to the discoordination of planning assignments. Wages are planned in "nominal" rubles, that is, in those monetary symbols which we see in the stores and service enterprises while the goods are sold, naturally, in actually existing prices. And yet the assignments for producing goods and services are submitted to the enterprises in comparable prices which are unsuitable for coordinating monetary incomes with the commodity coverage. Industrial products are planned in comparable prices of the enterprises (not including turnover tax) which are far from the actual sales prices in the retail trade network.

During the first 2 years of the current five-year plan the proportion of the consumption fund in the utilized national income decreased somewhat both in comparable prices and in actual prices. The growth rates of group B (in comparable prices) exceeded the rates in industry, but the proportion of group

B in actual prices decreased from 26.2 to 24.9 percent. In principle the enterprises can fulfill the assignments for increasing the output of consumer goods in comparable prices and still not provide commodity resources for retail commodity turnover.

Table 2

	<u>1971-1975</u>	<u>1976-1980</u>	<u>1983-1984</u>
Average annual growth rates of retail commodity turnover, %	7.2	5.2	4.2
Actual	6.4	4.4	2.9

Calculated from the same sources as Table 1.

In the interests of the matter the enterprises that produce consumer goods should therefore plan their output in retail prices (and for the most important positions--in physical terms) and link the assignments to the wage fund.

A ratio between the rates of growth of the productivity and the payment for labor which is efficient for the national economy cannot be mechanically extended to the economic subdivisions. Balanced economic growth during the course of scientific and technical progress not only does not presuppose, but even precludes a uniform increase in labor productivity in all branches and industries. It is typical of periods of rapid growth of production to have a strong differentiation of branch rates of labor productivity and vice versa.

The Level of Branches, Associations and Enterprises

Because of the sharp differentiation in the rates of growth of labor productivity, their relationship to the rates of wages (K^{PO}) in economic subdivisions cannot coincide or even come close to one another. This is prevented by the social function of payment for labor--the equalization of the rise of the standard of living of the groups of workers.

If the same rates of growth of labor productivity and wages had been in effect in machine building and ferrous metallurgy, the wages of a worker during 1961-1980 would have increased in the first branch fourfold, and in the second--2.2-fold. In fact, wages increased twofold and 1.8 fold, respectively. As statistics show, since 1960 in the branches where the labor productivity increased more rapidly, the value of K^{PO} , as a rule, turned out to be greater than the average for the national economy (industry). Correspondingly, the slow growth of labor productivity in an individual economic unit was accompanied by a reduction of the K^{PO} as compared to the national economic (branch) level.

Because of the aforementioned reasons the differentiation of K^{PO} is objectively necessary. It is even more necessary to have methods for changing over from an efficient national economic ratio to branch indicators, and from these--to coefficients for the associations and enterprises. The rules for the differentiation of the K^{PO} must motivate the cost-accounting subdivisions

to increase labor productivity and to utilize labor resources and production capital efficiently.

Recommendations concerning more rapid growth of productivity as compared to the average wages in calculations of the normative of wages per ruble of output are widespread in methodological literature. "The degree of this difference is determined by the concrete conditions of the operation of the association (enterprise), factors in the growth of labor productivity and the proportions of the increase in output resulting from increased labor productivity envisioned in the calculations for the five-year plan."⁸ But there too the normative of wages per ruble of output is determined as the ratio between planning expenditures for wages and the output of products.⁹ Thus when forming the normatives for wages per ruble of output the ratio K^{PO} plays a subordinate role, and the main component of the calculation is still the wage fund which, as before, is planned from the level that has been reached.

The standard methods for the development of the technical and industrial financial plan published in 1979 recommend that the associations and enterprises determine the planned growth of the average wages of workers and employees (not including payments from the material incentive fund) in t year of the five-year plan (DZP_t) according to the formula

$$DZP_t = \sum_{K=1}^n DV_{kt} N_k$$

where DV_{kt} --the planned increase in labor productivity as a result of K factor, N_k --normative of increase in wages per 1 percent increase in labor productivity under the influence of K factor, n --the number of technical and economic factors.¹⁰

But how does one determine the partial normatives N_k ? There is no answer to this either in the standard or in the branch methods of the industrial ministries. Therefore the enterprises generally do not turn to complicated calculations of the increase in the average wages or select partial coefficients which taken together would justify a minimum increase in labor productivity.

Attention should also be given to the fact that in the planning calculations of the ratios between productivity and wages (at the level of the ministries and enterprises) they do not take into account payments from the material incentive fund or funds for centralized measures for increasing the wages of workers and employees. In order to come up with efficient proportions between the commodity and monetary mass in the calculations, it is necessary to keep in mind the entire totality of funds that go for wages and this, in turn, presupposes methods for regulating the average wages in the various branches and departments.

The periodic increase in wages for various categories of workers is directly mainly toward enlisting additional workers, or else it is called upon to retain them in their jobs. When in one or another branch of the national economy or group of occupations a "sore spot" appears, they try to take care

of it by increasing the wage rates and salaries--both for those whose work is A+ and those whose highest rating was C-. Therefore there shortly arises a new "sore spot" and so forth along the chain.

The arrears of the branch and the complaints of the consumers about its products have become an "ironclad" argument for increasing wages. In 1960 the average wages of employees in trade, material and technical supply and procurements and a ratio to the wages of industrial production personnel of 0.64:1, and in 1980--0.74:1. The result was not slow in being manifested: the average annual number of workers in commodity-producing branches produced twofold, and the number of industrial production personnel increased only 1.6-fold. And in the majority of stores everything was as it was before: groups of salesmen heatedly discuss their problems and wait for the end of the month so that in the last 3 days, because of the shortage, they can fulfill the plan and receive a bonus.

Let us calculate and think about this. During 1961-1980 the number of people employed in commodity-producing branches increased by 5 million while the average annual wages in 1960 were 707 rubles. The total additional earnings because of the larger number amounted to 3.5 billion rubles. But what if even half of this amount had been directed toward the development of progressive forms of trade and providing the work stations with modern equipment and half of the increase in workers had been employed in industrial production?

Another example is metallurgy. In 1980 the average monthly wages increased by 12 rubles or 5.9 percent as compared to the preceding year. This is a 3.5-fold average annual increase over the preceding 4 years of the 10th Five-Year Plan. For comparison: in the same year of 1980 the average monthly earnings in electrical power engineering increased by 4 rubles, in the coal industry--3.4, in the chemical and petrochemical--4.2, and in machine building and metal processing--5.2 rubles.¹¹ At the same time more than 200 million rubles were spent for increasing the wage fund in ferrous metallurgy alone. How was this significant addition justified? In 1976-1979 the average annual rates of increase in output amounted to 2.4 percent, and labor productivity--2 percent, and they were lower than in other leading branches and also lower than the average for industry. In 1979 the production of ferrous metals and labor productivity remained practically at the level of the preceding year. Approximately the same thing took place in 1980. Thus the subsidy received by the branch for increasing average wages was not justified by the increase in labor productivity, but served for interbranch leveling of the wages. Indeed, in 1961-1965 the average wages for workers in ferrous metallurgy exceeded the wages in machine building and metal processing 1.5-fold, by 1970 this ratio had decreased to 1.14, by 1979--to 1.1, and in 1980 it increased to 1.14.¹²

On the Path of Planned Regulation

There is a law in effect in the national economy: an increase in the proportion of the national income going for accumulation of fixed and circulating capital, that is, for increasing the capital availability for labor, involves a reduction of the proportion of the consumption fund, and vice versa. The effect of the law should be extended to the branch ministries and to the large production associations. The branches and associations that

lay claim to higher rates of growth of capital availability should be given correspondingly lower normatives for increasing the average wages for each percentage of increase in labor productivity, and vice versa.

The proposed methods for differentiation of the national economic indicator K^{PO} for the various ministries and associations is given a clear economic substantiation. The labor productivity of the workers calculated as output (in physical units or in monetary estimates) per unit of time depends not only on the quantity and quality of labor, but also to no less a degree on the quantity and quality of the means of production. The utilization of the potential capabilities of the technical equipment depends on the worker, but with the same attitude toward labor greater productivity is provided by workers with higher capital availability. On the other hand, with the given capital availability high output indicates the quantity and quality of live labor.

As an analysis of statistics shows, deviations in the ratios between the growth of productivity and labor in the various branches and the average for industry, as a rule, are closely correlated with variations in the rates of growth of capital availability (Table 3). At the same time the branch values of K^{PO} are appreciably influenced by deviations in the rates of growth of labor productivity and the number of employees: these indicators in the various branches usually deviate in the same direction. In other words, deviations of the branch values of K^{PO} for the average for industry result from divergences in the rates of capital availability, labor productivity and the number of workers, and accelerated growth of the first of these three indicators corresponds to a reduction of K^{PO} , while the two others correspond to an increase.

Take, for example, data for machine building and metal processing. The increase in labor productivity during 1961-1970 of 33 percentage points outstripped the consolidated indicator for industry and the growth of the number of workers--by 20 points, but lagged behind the growth of capital availability by 14 points. The total diversion was equal to +33 and the branch K^{PO} exceeded the average for industry by 0.24.

During the decade of the 1970's the ratio between the branch and average industry growth rates changed appreciably: for labor productivity it increased to 48 percentage points, for the number of workers it decreased to +11, and the increase in capital availability became positive (+9). The sum of deviations (+68) turned out to 1.7 times greater than in the preceding decade, and the value of K^{PO} increased from +0.24 to +0.35 or 1.5-fold.

In 1961-1970 in all branches (except for electrical power engineering and ferrous metallurgy) the deviations of K^{PO} and the sum of the growth rates of labor productivity, the number of personnel and the capital availability of the average values for industry were in the same direction. In 1971-1980 electrical energy, power engineering and ferrous metallurgy ceased to be exceptions from the general rule.

The dependency can be observed, however, only in small segments of time and not in all branches. It seems that the reinforcement of the empirical law is

the form of the methods of planning the ratios of the growth rates of labor productivity and wages could be one of the means of coordinating public and collective interests.

Table 1

	1967-1970				1971-1980			
	Growth rates, %				Growth rates, %			
	Product- ivity	Number of Workers	Capital Availa- bility	KPO	Product- ivity	Number of Workers	Capital Availa- bility	KPO
Industry, total	1.14	46	77	46	1.10	46	77	46
Deviations from branch indicators from consolidated indicators for industry:								
Electric energy	0	+10	+17	+17	-0.25	-5	+5	-1.9
Ferrous metallurgy	+0.06	-7	-11	+11	-0.11	-18	-12	-0
Chemical and petrochemical industry	+0.28	+34	+38	+33	+0.24	+24	+0	+14
Machine building and metal processing	+0.24	+33	+20	-14	+0.35	+48	+11	+9
Timber, wood proces- sing and pulp and paper industry	-0.14	-9	-30	+13	-0.11	-14	-16	+13
Construction materials industry	+0.01	+21	-15	+14	-0.06	-17	-2	+9
Light industry	+0.27	-29	-12	0	-0.14	-14	-10	+2
Food industry	-0.22	-17	-10	-4	-0.18	-25	-8	-7

Sources: USSR National Economy in 1970, pp 136, 161, 165; USSR National Economy in 1980, pp 127, 139, 144; VESTNIK STATISTIKI, 1971, No 9, pp 87, 88; 1972, No 11, p 93; 1981, No 8, p 79.

The practical point of the proposed method of differentiating the ratios of KPO is to increase the motivation of the ministries and associations for intensification of production. As we know, the utilization of fixed and circulating production capital leaves something to be desired and there are large reserves here. Economic managers and collectives must be given a choice: either increase the output of products with existing equipment and achieve a maximum return from newly introduced capacities--and then some of the capital expenditures that are saved can go for increasing the wage fund and bringing the rates of their growth closer to the rates of productivity, or it would be necessary to retard the growth of the average wages.

Because of the limited labor resources it is becoming a primary task to counteract unjustified attempts to increase production not through ability, but through numbers. Economic managers are directly interested in increasing the number of workers. Since this automatically increases the wage fund, it

means changing the enterprise over to a higher category with an increase in salaries for management, and so forth. There is apparently some point in limiting the growth rates of the average wages (as compared to the average in the national economy) in the branches and associations for a large part of the increase in output is achieved as a result of increased numbers of personnel. On the other hand, the collective whose labor productivity is greater than the output of products should be encouraged through higher norms for increasing the average wages for each percentage point of increase in labor productivity.

First there would come point in developing and introducing into the practice of planning a system of coefficients that establishes the dependency of KPI on the growth of the number of workers. The coefficients will serve as incentives for collectives that are expanding production without increasing the number of employees and, conversely, they will be a form of "payment" for enlisting labor resources.

Let us say that in the base period the labor productivity of the workers of one economic subdivision or another has increased 1.05-fold, the average wages--1.03-fold, and the ratio between the rates of growth amounted to 1.02. It has been established that for each percentage point of increase in the number of workers this ratio is increased by 0.31 points. If the number of employees has increased by 1 percent, in order to retain the existing growth rate of wages labor productivity must be increased 1.06-fold, and maintaining its previous rates of growth will lead to a reduction of the index of average wages to 1.02. Each subdivision thus notes ahead of time that it will cost to increase the number of employees and how this will influence the average earnings. Such a mechanism will contribute to searching for reserves for intensification of production and increasing the effectiveness of the utilization of labor resources.

FOOTNOTES

1. "The CPSU and Resolutions and Decisions of Congresses, Conferences and Plenums of the Central Committee," part I, Moscow, Gospolitizdat, 1953, p 902.
2. KOMMUNIST, No 3, 1983, p 15.
3. EKO, No 6, 1982, pp 115-130.
4. PRAVDA, 16 November 1984.
5. Calculation from sources for Table 1.
6. PRAVDA, 27 December 1983; 27 February 1984.
7. The production of goods for cultural-domestic and household use is planned in two prices--wholesale and retail; for group B of industry the all-inclusive indicator from the enterprise to the national economy up until 1984 was the commodity output in comparable wholesale prices of the enterprises.

8. "Metodicheskiye ukazaniya k razrabotke gosudarstvennykh planov ekonomicheskogo i sotsial'nogo razvitiya SSSR" [Methodological Instructions for the Development of State Plans for the Economic and Social Development of the USSR], Moscow, "Ekonomika", 1980, p. 917.
 9. Ibid., p. 560.
 10. Standard Methods for Developing the Technical and Industrial Financial Plan for the Production Association (Combined) or Enterprise," Moscow, "Ekonomika" 1979, p. 146.
 11. VESTNIK STATISTIKI, No 8, 1981, p. 79.
 12. VESTNIK STATISTIKI, No 9, 1971, pp. 8/-88; No 11, 1972, p. 74.
- COPYRIGHT: Izdatel'stvo "Nauka", "Ekonomika i organizatsiya promyshlennogo proizvodstva", 1985

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CSO: 1820/169

PROCEDURES FOR ORDERING INVENTIONS CLARIFIED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 117-125

[Article by R. P. Vcherashniy, candidate of technical sciences, Informelektro (Moscow): "The Branch Informs About Orders for Inventions"]

[Text] The desire to compensate for one of the shortcomings in the patent system--the length of time it takes to publish information about inventions--has led to the appearance in a number of countries of systems for postponing expert evaluations, which envision the publication (display) of the applications on the invention. The discussion of the expediency of introducing in the USSR the delayed expert evaluation has revealed both positive and negative consequences of such a step. As has been noted (see EKO, No 4, 1982), the publication of a large number of applications which has not been considered by experts involves not only certain organizational difficulties, but, in a number of cases, can also lead to forfeiting commercial possibilities and essentially to the utilization abroad of domestic developments free of charge.

It is also fair to say that some of the application materials have little information value and only clog the system of scientific and technical communications.

Searches for a satisfactory solution to the aforementioned contradiction were undertaken as early as 5 years ago in the electrical equipment industry. The impetus for this was the creation of a branch system for monitoring invention and patent-license work (the PLIZ system). On analyzing orders coming in from various enterprises it was established, in particular, that there are cases of parallel creation in various organizations of analogous technical decisions at the level of inventions. This led to the idea of the need to organize intrabranh information concerning the applications for inventions that are submitted by the organizations and enterprises of the branch.

The expediency of creating a special system was reinforced by the following preconditions. Information about parallel development makes it possible to save money and accelerate the receipt of the necessary technical documentation. Moreover, a large part of the orders that are submitted from the enterprises and organizations of the branch are regulated by a special

plan for so-called protected subjects, that is, both of which are directly related to the developments.

Here the probability of parallel invention is not so small. On the other hand, favorable conditions are created for the utilization in the "parallel" object of protectable solutions which have already been created by colleagues and which increase the ability of the item as a whole to compete.

The system of information about applications, finally, should also take into account the circumstance that according to legislation in effect in the USSR the object of an invention cannot be divulged until there is a decision from the board of experts and it is published in the official bulletin of the State Committee for Inventions. This provision agrees with the aforementioned remarks concerning the possibility of utilization abroad free of charge of technical decisions that have been developed in the USSR.

The proposals of individual participants (A. Ya. Pavlotskiy and V. A. Abukhov) at the discussion that was held in EKO concerning the publication of application materials in branch summaries of publications and the display of these in branch information centers do not eliminate the difficulties that arise either: increasing the volume of information and publishing activity and preventing access to application materials of an unlimited group of individuals. A solution was found by "substituting" the main document with a "representative" of it in the information system, and also the application of modern conditions for selective distribution of information which does not require additional publishing expenditures.

A study of the psychology of a specialist who uses information shows that in the first stage he is interested not in the essence of the decision that is described but in the possibility of utilizing it to achieve his own invention goals. Replacing the essence of the invention with a description of the effect that it is achieved does not reduce the information value of the notification for the specialist but, in a number of cases, on the contrary, improves the perception of the information.

The mandatory indication of the purpose of the invention in the summary makes it possible to judge immediately whether this invention pertains to the object of technical equipment or technology that is being developed by the person who is reading it, since the purpose of the invention indirectly reflects the totality of essential indicators. It is precisely the purpose and not the prototype-analogue that is the main reference point for the developer when creating a new object of technical equipment. Herein lies the distinction of formulating a research task in the task of an expert who has considered the innovation of the application in terms of the totality of existing indicators. If the expert is searching in the patent archives for a document which is analogous in terms of the totality of essential indicators to the decision that is being submitted, the specialist who is a developer selects that alternative which most effectively makes it possible for him to realize the purpose. Frequently there is "transfer" of technical decisions from associated areas which have nothing to do with the traditional area of research.

The introduction into the summary of indications of the category of the goal makes it possible to considerably expand the horizons of the research without thus burdening the developer with information he does not need.

By introducing into the information system a description of the effect that is achieved along with a description of the essence of the invention we are killing two birds with one stone: we do not divulge the essence of the invention and at the same time we improve conditions for "consumption" of the information. One should add to this that the authors of the proposals for the publication of applications in branch information publications have not taken into account potential violations of the rights of the inventors. Let us say that the application which has been submitted has been rejected by the board of experts, and the author has not disputed this. In this case he has the opportunity to formulate his suggestion as an efficiency proposal. If the enterprise has been informed of the essence of his proposal to the information system, he will not be given this opportunity.

Additional information introduced into the information system: the name of the invention, the index of the international classification of inventions, the area of application, the degree of assimilation, a brief description of the prototype, and information about foreign patenting make it possible to come to a decision about the expediency of becoming familiar with the technical documentation and the application materials. The information service performs a role like that of a "matchmaker" who introduces the potential user and the developer's organization, who can solve all problems that arise in the utilization of "someone else's" experience on the basis of an economic agreement.

Let us make a small excursion into the area of scientific information activity. Modern automated information systems have essentially changed the nature of relations between the specialist and information. While previously the information published in large volumes, whether it was being used or not, whether it was timely or not, came across the desk of the specialist (and is still doing so), the modern system offers him the opportunity to turn with a specific request to a particular database and rapidly receive the necessary information. Not all information systems can offer such a service yet. But the majority of systems have realized the principle of selective distribution of information (IRI) whereby the information is delivered to the user on his individual request. It is precisely the IRI system that was used in the creation of the service for information about domestic applications for inventions (OZI service).

300,000 and Two More

The OZI service was created as an element of the system of patent-information support for development (PLIZ-Z). The PLIZ-Z system is the information foundation for the branch system that is being developed for controlling invention and patent-license work. This system envisions control over the fulfillment of the plan for the creation of inventions (the creation, and not only the utilization!), the evaluation of the quality of the applications that are submitted from the enterprises and organizations of the branch according to the results of the state expert evaluation, information support for

protectable subjects for scientific research developments and experimental design work, and management of the provision of the branch patent fund and other tasks. The information part of the PLIZ-Z system provides all head organizations of the branch according to their profile of activity with information about all published patent documents, it controls centralized sending to the organizations of the branch of copies of complete descriptions of inventions (including foreign applications for inventions in the countries where they are published), and it keeps documents on centralized calculations from the Polish Scientific Production Association of the State Committee for Inventions for Patent Materials that are offered. During the course of a year the branch patent fund receives about 300,000 patent documents. The OZI service adds to this about 2,000 more documents concerning applications that have been submitted by the branch. Although about half of the applications that are submitted are rejected, they are used by specialists in the process of scientific research and development. The advantage of the system of information on applications is also shown by the high percentage of positive decisions on the part of the board of experts for applications in the branch.

From the results of the experiment of the electrical equipment industry it will become possible to disseminate information regarding applications to other branches of machine building as well, within the framework of the Unified System of Scientific and Technical Information on Machine Building (YeS NTIMash). The decision adopted by the council of the YeS NTIMash concerning the creation in Informelektro--the center of information of the electrical equipment industry--a computer center for collective use will contribute to this.

Functioning of the OZI service is carried out on the basis of instructions of the technical administration of the Ministry of the Electrical Equipment Industry, "On Organizations of Information Concerning Domestic Applications for Inventions Created by Enterprises of the Branch." The document establishes the policy whereby all enterprises and organizations of the branch, within 10 days after receiving from the VNIIGPE information concerning the receipt of applications for consideration, must send to the OZI service a specially prepared categorized summary. The summaries are drawn up for all job inventions and for inventions that are created through initiative, since the authors themselves are interested in the utilization of their proposals by the branch.

The drawing up of summaries of applications that are submitted is regulated by the branch plan for information and is paid for by Informelektro. In the OZI service the summaries are systematized and monitored. Here they establish cases in which the enterprise has submitted an application to the VNIIGPE but has not sent a summary to the OZI service, they discover parallel developments and the degree to which the main part of the applications that are submitted respond to subjects that can be protected, and so forth. The requests of the organizations are stored in the PLIZ-Z system in the form of a list of indexes (rubrics) for international classification of inventions. There is a total of more than 50,000 of these requests that are permanently in effect.

The information demand of the enterprises thus expressed makes it possible to easily identify the order that is received with the request. To do this it is

enough to compare the MKI index of the application with the patent rubric of the system. The limited volume of the mass of incoming documents satisfactorily solves the problem of identifying the requests and documents without using computer equipment. As the number of incoming documents and user subscribers increases (now there are about 50) the operation of distribution can be successfully carried out within the framework of the existing system of the PLIZ-2. If the subject of the application corresponds to a request from an organization, a copy of the summary is sent to it, and if necessary it is notified of the data concerning the developing organization.

Concerning the Summary

In keeping with GOST 7.9-77, "The Summary and Annotation," the standard summary should include the following information: the subject, the nature and the purpose of the work, the method of conducting the work, concrete results, conclusions and the area of application.

When the requirements for this summary of the application are being developed the instructions of the standard are taken into account. But the basic purpose of the requirements for the summary indicated in the standard is to reflect as completely as possible the essence of the decision that is being described. The task of drawing up the summary for the application is different--without revealing the essence, to reveal the interest of the specialist in utilizing the decision that is proposed to him. Therefore, along with the requirements of the standard concerning mandatory indication of the goal of the work, the area of application and the basic bibliographical data, the instructions "Requirements for the Summary of the Description for the Application for an Invention" include provisions which limit the list of information that is provided. In keeping with these instructions the summary for the application should contain the basic biographical data, a description of the known level of technical equipment, a brief presentation of the area of application, the purpose of the invention and the technical and economic effect. But it should not reveal the distinguishing indicators of the invention, that is, it should not include a description of the concrete components, the methods of implementation, the materials that are used, the ratios of sizes and other indicators that characterize the innovation and the essential distinguishing features of the invention.

In order to facilitate the work of the authors of invention for participating along with specialists of the patent service in drawing up summaries, the OZI service has drawn up and reproduced blanks of categorized summaries. This blank is a prepared outline which contains certain phrase-markers. Each phrase indicates on the blank the area for the corresponding element of the notice. For example, "Purpose of the Invention," "Known," and so forth. Each marker is given a code which makes it possible to rapidly find the necessary fragment of information in the research system. The categorization of the data contained in the summary considerably facilitates the process of indexing, it precludes losing the necessary information, and it creates conditions for automation of the procedures of processing and searching for information. The summary makes it possible to judge the expediency of obtaining from the developer organization similar information about the object of invention, including technical assistance on the established legal basis

(for example, on a contractual basis with a simultaneous insurance of the rights of the authors within the norms determined by the "Provisions Concerning Discoveries, Inventions and Efficiency Proposals"). The summary also contains information about the degree of readiness of the technical documentation for the subject of the application for commercial implementation (report on scientific research and experimental design work, the technical plan, the set of working documentation) and also concerning the availability of an experimental model, a mockup and so forth.

Difficulties and Prospects

The introduction of any system, including an information system, requires the development of certain traditions. This pertains fully to the OII service as well. It is not enough to develop certain general provisions, produce regulatory documents and conduct experiments. Daily explanatory work is needed in order to reveal and organize the receipt of summaries for the entire flow of applications that are accepted for consideration in the VNIIGPE. In spite of the comparatively long period of experimental testing of the system, we have still not managed to achieve 100 percent receipt of all summaries for all of the applications that are submitted. Each year summaries are sent to the service for only 70 percent of the applications. As of the middle of 1984 a total of about 10,000 summaries has been accumulated.

Another shortcoming of the functioning of the system is the fact that it delays sending out the cards, it does not publish data concerning changes in the status of the application, and so forth.

The work experience with enterprises also shows that they do not utilize the information they receive effectively enough. This is explained partially by the fact that the information sent to the organizations does not contain complete data about the possibilities of introduction, particularly about difficulties in the utilization of the proposed decisions (violation of the level of standardization, the need for special technological equipment, materials, skilled personnel and so forth).

The main thing that distinguishes the information that comes in on applications from all of the other mass of information and announcements that come into the organizations is that, as a rule, the appearance of the application is preceded by the development of technical documentation (especially when one is speaking about job inventions), and there is also documentation "within" the branch. Those who find it necessary to receive working documentation on the introduction of innovations from a different department know the difficulties this entails. Therefore the value of the branch application material from the standpoint of the possibility of utilizing the technical and technological experience included in them are immeasurably greater. A bird in the hand is worth two in the bush!

The time has come to expand the framework of the experiment. The State Committee for Inventions should express its important opinion regarding this.

In our opinion, attention should also be given to the question of creating an OZI service on a unionwide level. Perhaps this will be the decision that will make it possible to accelerate the utilization of domestic developments in the national economy.

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RESPONSES TO THE ARTICLE ON PLANT DESIGNERS

Novosibirsk KEMNENIIE I IZDAVATELSKAYA PRIZHIVKA VOENNO-PROMYSHLENNYKH SVOYESTVOV 848
Russian No 4, Apr 85 pp 126-127

[Responses to the article by G. P. Goshko, "The Plant Designer: Profession, Problems and Capabilities," 848, No 1, 1985 prepared by L. Shchegoleva, "A Subject Which Bothered Many"]

[Text] A fairly significant amount of time has passed since the publication of the article on the plant designer. The editorial staff has received interested responses to this article. It is noteworthy that many of those who wrote to the editorial staff are familiar with the creative work of the designer K. F. Kostin.

"I met Konstantin Fedorovich at work as early as 1936 on the construction of the Moscow-Volga Canal. Then--at the Alapayevskaya GES and during the planning of the Shirokovskaya GES in the Urals. We had close contacts when designing the first modern spillway in the world at the Kamenskaya GES and the dam at the Bratskaya GES. In the latter case the generators of the Uralelektrotiyazhmash Plant could compete with the generators of the Leningrad Elektrosila. Each of the plans had their own merits. Unfortunately, we did not manage to 'combine' them and the generators of Elektrosila were accepted. My last contact with Uralelektrotiyazhmash was on the technical design for the electric power station." (From the letter of B. S. Uspenskiy, labor veteran, electric power engineer, participant in the implementation of the GOELRO plan, Moscow.)

Reading letters like these does more than familiarize us with the history of Soviet hydroelectrical machine building. It is as though we are penetrating into the "clan" of the designers, into that special world where new designs originate.

The majority of the letters that came into the editorial office were very emotional, even though their authors are serious, honored people who have a great deal of experience in life. In all of the topics one could see a deep love for their profession, an awareness of its significance--for the designer stands at the cradle of scientific and technical progress.

diverse projects in which people from different professions and specialties work together, and they receive encouragement. They go through what we call "conversations to their edges," but they do not believe in the very real possibility of them. They either do not have any or very few of them. As a result, as with many enthusiasts and amateur children, but the economic need to improve the sectoral situation of the designers and technicians has prevented the higher collective to quite realize.

"As concerns enlisting designers for various jobs, and based on our experience, we think and even have already that one assigned to the design department in learning from all industrial knowledge and experience that need of all reconstruction is in progress, each month we must not only accept up to 1000 and, of course, we go for success and achieve significant gains. The question happens that we are instructed to design everything for agriculture, but this is very rare."

The authors of the letters associate the decline in the prestige of the profession with the flaws in the training of future designers.

"Possibly we should develop more extensively in the houses of preschool and schoolchildren, and also in the schools and vocational-technical schools groups for technical creativity and produce more intelligent and inexpensive games relating to design work and more aggressively familiarize the children with design possibilities when they enter the institutes. And it would not be a bad idea to weed out the students who have no inclination for design work in various stages of coursework and even diploma planning. Only a strictly scientific approach to the selection and training of designers will provide the national economy with real creators of new technical equipment." (From the letter of Yu. I. Azbukin and Ya. S. Urintsev.)

And here are some excerpts from the letter from B. S. Uspenskiy:

"With the immense confidence which the country places in the designer when he is designing a machine, which is sometimes unique, the way they care for him seems quite absurd, and they only insult him and place him in a hopeless situation. For example, the impossibility of handling the wage fund within the limits of the established normatives and so forth.

"I agree with K. F. Kostin when he says that design work is above all male work. Of course there are excellent designers among women. An example is the head specialist for hydraulic aggregates of the Moscow Gidroyekht Institute, M. G. Obrotova, a talented engineer and designer. But she is one female engineer in a thousand!

"It seems to me that one should think about creating conditions for enlisting mainly talented male students in design work.

"I fully support K. F. Kostin the issue of 'hastiness' in design work. If it took 2 years to design an object and 8 years to construct it, this must change the situation. For it is very easy to 'think things out incompletely,' but it is considerably more difficult to rectify this later.

READERS RESPOND TO ARTICLE ON ENGINEERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 130-131

[Response to the article by S. S. Starshinov, "The Role, Payment and Return From the Engineer," EKO, No 2, 1984, by L. Ye. Strovskiy, candidate of economic sciences, Uralsk Polytechnical Institute (Sverdlovsk): "The Engineer-Worker"]

[Text] I wish to recall one contradiction. They say that we are overproducing engineers. On the other hand, when an engineer is transferred to being a worker, of whom they say there is a short supply, we recall that considerable funds have been invested in his training. These funds have been discarded since they are of no use. Obviously this is a subject for an in-depth study--economic and sociological.

We conducted an investigation in two large shops at the Nizhne-tagil Metallurgical Combine imeni V. I. Lenin--the Roasting Shop No 2 and the Blast Furnace Shop. Of the workers here 14.7 and 16.8 percent, respectively, had a higher education. What drew them to these jobs? The questionnaire produced the following results: 33 percent indicated the higher wages (these were mainly young specialists under 30 years of age); 9 percent were attracted by the lesser amount of responsibilities; and 21 percent of the engineers questioned turned out to be, in their own words, workers by vocation, and they wanted initially to perform precisely this role in production.

It is interesting that in response to the question of why they entered the institute 78 percent said that it was in order to increase their general educational level and acquire technical knowledge, and 22 percent said that it was because of their interest in the occupation.

To the question of whether the respondents could work in the position of engineering and technical personnel 80 percent responded in the affirmative. A desire to change to other positions was expressed by 44 percent. The main factor standing in the way of this kind of transfer given by 25 percent of the workers with a higher education was the shortage of experience in the work; an equal number indicated the lack of vacancies, and 17 percent blamed the opposition of the shop management. It is noteworthy that the number of practical and technical workers in engineering positions at the combine

exceeds the number of specialists with a higher education in the positions of workers.

An interesting approach was taken at the Pervouralsk New Type Plant. On an order from the director engineers are generally not hired as workers and with respect to those who are already working in the jobs, for 1983-1984 they developed a schedule for transferring them to positions of engineering and technical personnel and employees.

It seems that there is nothing contradictory in the contradiction that was mentioned at the beginning of this note. The position of the engineer in production has taken form, "been shaken up," and requires serious changes, but not partial adjustments. One cannot agree with this point in the article by S. S. Starshinov.

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CSO: 1820/169

WORK-STUDY EDUCATION PREDICTED FOR FUTURE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 132-149

[Article by Yu. S. Avraamov, doctor of technical sciences, professor, rector; N. G. Khokhlov, candidate of technical sciences, docent, prorector for training work; and K. A. Osipov, senior instructor, Plant-VTUZ at ZIL (Moscow): "The Plant-VTUZ--One of the Prospects for the Higher School"]

[Text] The decree of the April (1984) Plenum of the CPSU Central Committee, "On the Main Directions for the Reform of the General Educational and Vocational School," in order to improve labor training, education and occupational orientation of the students, suggests assigning to each school and vocational and technical school a base enterprise, organization or institution. Today it is especially important to devote attentive study to the experience of plant-VTUZ's that are already in operation. It is quite possible that this is one of the main prospects for the development of higher polytechnical education.

Morning and evening cheerful youth filled the auditoriums of the two nine-story buildings on Avtozavodskaya Street. This is the Plant-VTUZ at the Moscow Automotive Plant imeni I. A. Likhachev, one of the many higher educational institutions in the capital.

There are features which distinguish its students from their comrades in other VUZes. In the breaks between the lectures there is none of the noise which used to be heard in school recesses, the students walk through the corridors more calmly. But the main thing is the expressions on their faces. Each student in the Plant-VTUZ is a working man, a person who has lost his childishness, one who knows what labor is. These are workers, and they regard training as work which requires conscientiousness and complete investment of themselves.

The articles presented below discuss the Plant-VTUZ, its successes and difficulties. We should like for the reader to see behind all the particularities the figure of a new type of student.

The first plant-VTUZes were formed in our country at the beginning of the 1930's in keeping with the decision of the November (1929) Plenum of the Central Committee of the All-Russian Communist Party (of Bolsheviks). They made a remarkable contribution to the training of skilled specialists from the working class. Their second birth dates from 1960. Now there are 10 of these training institutions. The largest of them are at ZIL (5,000 students) and at the Production Association for Labor Placement, the Leningrad Metal Plant (3,000 students). There are also seven branches and one department of large VUZes. A total of about 10,000 students are training in them, or 0.2 percent of the overall number of students in the country.

In our opinion, the "plant-VTUZ" system deserves to be considerably more widespread. During 25 years it has formed its own methodological and organizational principles. Plant-VTUZes are higher educational institutions which train engineers right in production. At first, in keeping with the standard provisions concerning the plant-VTUZ, the base enterprises¹ sent to them their most capable and prepared leading workers in production with 2 or more years of work experience. But since the middle of the 1960's it has become more and more difficult to select such people and the problem of forming the student contingent has been aggravated. Many production workers with tenure have preferred the evening form of training. Beginning in 1967 it was decided to admit school graduates to the plant-VTUZ in the occupational areas of the base enterprises. For the next 10 years this is precisely how 80-90 percent of the students were selected. As time has shown, the "plant-VTUZ" system, which was created for training engineers selected from the skilled workers, is viable and fairly effective for training specialists from evening schools who do not have labor skills or production experience.

Training in the "plant-VTUZ system" is mixed. For approximately half of the 6 years the future engineers train without leave from production, and for the rest of the time they do have leave. The advantage of the form of training without leave is retained--its economy, since the period during which able-bodied youth are excluded from the production sphere is cut in half. At the same time the plant-VTUZ has advantages over the correspondence and evening institutes, one of whose main shortcomings is the weak possibility of controlling the labor activity and professional growth of the students. In the "plant-VTUZ" system this control is an important element of the training and education of the future specialists.

The conditions for alternating training and work are different for the various plant-VTUZes, depending on the specific features of the base enterprises. At the plant-VTUZ at ZIL the first course is a training course, the second-fourth--weekly alternation between training and work, the ninth semester--training, the 10th and 11th semesters--work with studies in the evening form, and the 12th semester is--the diploma project. Other plant-VTUZes have alternation by weeks or semesters.

The main distinguishing feature of this system is the organic combination of theoretical training within the walls of the VTUZ and the production activity at the enterprises. The training plans envision a specific kind of studies--engineering-production training. It includes the work of the students at the base enterprises for the specialties they are receiving with mandatory sequential movement along the chain of "worker-engineer." In parallel they are given a theoretical course entitled "Fundamentals of Engineering Production Training" for all 6 years of training in the programs for profiled departments. The course envisions training in the VTUZ, study of the divisions of special disciplines in production and the fulfillment of semester study projects.

The "plant-VTUZ" system enables the enterprises to flexibly develop the necessary specialists long before they complete the training institution. As distinct from the traditional higher school, this system is more dynamic and has more sensitive feedback from industry. In order for any VUZ to change over to training engineers in a new specialty or specialization, it is necessary to develop the professor-instructor personnel, to create the necessary material and technical base, to reveal the need for the given specialists in the country, to raise the issue before the USSR Ministry of Higher and Specialized Education and to obtain the corresponding permission. This, as a rule, takes several years. During this time the enterprises and scientific research institutes are forced to train personnel through their own efforts as best they can. In the plant-VTUZes the individual training plants make it possible to envision a large number of disciplines that is established by the council of the VTUZ. When training engineers in new areas of science and technology they extensively utilize the material and technical base of the enterprises, and plant specialists are enlisted to prepare new training courses and to teach the students. The need for personnel in the association is well-known. It is established by the head specialists of the base enterprises, their personnel services and also the teachers of the profiled departments. Admission to the new specialties is approved on the spot by the Minvuz.

When the plant-VTUZ was opened at ZIL engineers were trained in it for six specialties, and at the end of the 1970s--nine specialties and several specializations ("Motor Vehicles and Bodies," "Repair and Modernization of Metal-Cutting Machine Tools," "Instrument Production" and so forth). In recent years new specializations have been introduced: "Robot Equipment," "The Production Organizer," "The Designer for Technological Fittings," and so forth. The specialty of SAPR ("System of Automated Planning") has been introduced, and they are preparing to introduce the specializations "Engineer-Adjuster for Flexible Automated Productions," "Engineer-Technologists for Precision Parts of Diesel Fuel Equipment," and so forth.

On the initiative of ZIL, in 1972 the plant-VTUZ introduced the specialty "Economics and Organization of the Machine-Building Industry" for engineer-mechanics with diplomas. Actually this is a department for increasing qualifications of management personnel of base enterprises. Promising young engineers from the reserve for advancement are also sent here for training without leave from production for a period of 3 years. After completing the

training the graduates receive a second diploma--engineer-economist. By 1983 more than 520 workers of base enterprises had received the second diploma.

Working in the plant-VTU are 30 doctors of sciences and professors, 185 candidates of sciences and docents, and 104 workers of the scientific research sector, and there are also 84 graduate students there. The influence of the training plant-VTUZ on the acceleration of scientific and technical progress in the association is constantly increasing. During the 10th Five-Year Plan the economic effect from the introduction of scientific research work carried out by VTUZ scientists at ZIL alone amounted to more than 10 million rubles. Under the current five-year plan ZIL in conjunction with the USSR Academy of Sciences, the Ukrainian SSR Academy of Sciences, Moscow State University imeni M. V. Lomonosov, the Institute of Atomic Energy imeni I. V. Kurchatov, the Moscow Vocational and Technical School imeni N. E. Bauman and others are working on important comprehensive scientific and technical programs. The plant-VTUZ is also participating in this work.

Let Us Compare the Forms of Training

Up to this point there has been a widespread opinion that the training plans of the plant-VTUZes are based on a lower level of theoretical preparation as compared to the generally accepted system. Let us try to analyze the situation using concrete figures.

Let us compare the training plans used at the plant-VTUZ at ZIL in the fifth group of specialties and the corresponding standard training plans of the traditional day and evening VUZes (see tables).

It is clear that their parameters do not differ significantly in the plant-VTUZ and the day institute (with the exception of the special cycle and production practice). The overall number of hours is generally the same. The divergences of 4 and 7 percent for the general engineering, general scientific and laboratory cycles can be successfully compensated for with engineering-production training of the students at the plant. The volume of special disciplines (taking into account the course entitled "Fundamentals of Engineering-Production Training") in the VTUZ at ZIL is 16 percent greater, and the work of the students at the plant exceeds the duration of all production practice of ordinary institutes sixfold: 120 and 20 weeks, respectively. Since we are now analyzing only the potential possibilities of the training plants and programs, let us say that the effectiveness of the production practice of traditional VUZes is comparable to the engineering and production work of the students of the plant-VTUZ for the same period.

From the table it is clear that the plant-VTUZ has more favorable conditions for the formation of the general and the occupational level of the engineers as compared to the standard evening institute.

So far we have been speaking about the potential capabilities of training specialists in the plant-VTUZ. Realizing them, naturally, depends on many concrete circumstances. In order to see the "practical outcome," let us turn to the opinion of the "consumers"--78 managers of facilities, shops and

administrations and head specialists of engineering services of AZIL, AZLK, GPZ-1 and the branches of ZIL in Roslavl, Ryazan and Mtsensk.

Table--Parameters of Training Plans of Plant-VTUZ
and Standard Day and Evening VUZes

Показатели (1)	Объем часов (2)			Отношение соответствующего показателя к общему объему часов, % (7)			Отношение соответст- вующего показателя к аналогичному показателю типового дневного или вечернего вуза, % (8)	
	(3) учебной вуз			(4) типовой вуз			(5)	
	Завод-вуз при ЗИЛе (3)	дневной (4)	вечерний (5)	Завод-вуз при ЗИЛе (3)	дневной (4)	вечерний (5)	Завод-вуз при ЗИЛе (3)	вечерний типовой вуз (9)
(10) Общий объем часов по учебному плану	4792	4793	3024	100	100	100	100	63
(11) В том числе циклы:								
(12) общинженерный и общенаучный	2820	2936	1949	59	61	65	96	66
(13) гуманитарный	1140	1140	457	24	24	15	100	40
(14) специальный	832	717	618	17	15	20	116	86
(15) лабораторный	595	639	402	12	13	13	93	63
(16) дипломное проектирование	540	540	540	11	11	18	100	100
(17) Производственная практика (работа)	4920	820	9717	103	17	321	600	1185

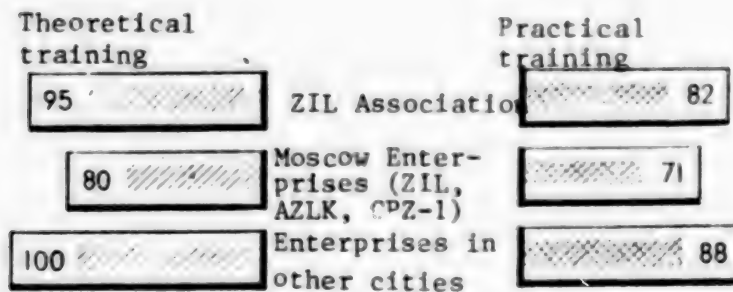
Key:

- | | |
|--|--|
| 1. Indicators | 9. Standard evening VUZ |
| 2. Number of hours | 10. Overall number of hours according to training plan |
| 3. Plant-VTUZ at ZIL | 11. Including cycles: |
| 4. Standard VUZ | 12. General engineering and general scientific |
| 5. Day | 13. Humanities |
| 6. Evening | 14. Special |
| 7. Ratio of corresponding indicator to overall number of hours, % | 15. Laboratory |
| 8. Ratio of corresponding indicator to analogous indicator of standard-day VUZ | 16. Diplomat project |
| | 17. Production practice (work) |

As the questionnaire (1982-1983) showed, 80 percent of these managers and specialists in the ZIL Association think that the theoretical training of the graduates of the institute there is the same or higher than that of the graduates of traditional VUZes. The same opinion is held by 69 percent of the experts from Moscow enterprises and 94 percent of those from plants outside

the city who were questioned. What is the reason for this difference in opinions? Apparently the difference has to do with the different working conditions for the graduates and the differences in the personnel immediately surrounding them. At enterprises outside the city there are many graduates from other VUZes of the country, and against this background the graduates of the plant-VTUZ make a favorable impression. Here their training is compared with the average level of graduates of engineering VUZes in the country, as distinct from the Moscow enterprises where the "competitors" have come from the MVTU imeni N. E. Bauman, the Moscow Automotive and Road Institute, the Moscow Machine Tool-Building Institute, the Institute of Steel and Alloys and other venerable, long-recognized higher educational institutions. And the plant-VTUZ at ZIL is a comparatively young institute which, naturally, cannot stand up to the others in terms of prestige, the qualifications of the instructors, the equipment of the laboratories, and so forth. And this, of course, has been reflected in the results of the evaluation.

Proportion of Managers and Leading Specialists Who Consider the Training
of Graduates of the Plant-VTUZ at ZIL To Be Adequate
and Meet the Requirements of Production, %



At the same time, at the Moscow enterprises themselves the opinions of those who gave the evaluations were divided. While at the AZLK and GPZ-1 20 percent of those questioned recognized that the theoretical training of graduates of the plant-VTUZ is lower than that of other institutes, at ZIL--this figure was 38 percent. It is difficult to explain this difference. One can only state that the ZIL workers have long been filling their ranks, as a rule, with graduates from the institute at ZIL, and AZLK and GPZ-1 have been forced to turn to other VUZes. The overall background changes corresponding. But on the whole the "consumers" have rated highly the theoretical training of graduates of the plant-VTUZ.

Now let us become familiar with the opinion of managers and leading specialists concerning whether or not the theoretical and practical training of graduates of the plant-VTUZ at ZIL meet the requirements of production (see figure). Of those managers and leading specialists who were questioned in the ZIL Association 18 percent think that graduates of the institute there do not have adequate practical (5 percent--theoretical) training. And this when the students during the years of their training spent more than 5,000 hours in

production! This situation is explained by the fact that the managers and specialists have placed too high a value on practical training--as the ability of the graduates to solve independently and intelligently practical engineering, organizational and economic tasks of the positions they hold. Of those who were questioned 90 percent recognized the engineering and production training to be satisfactory.

Attention is drawn to the lower ratings of the practical training at Moscow enterprises. The fact is that at the head plants they have more advanced technology and labor organization, and the technological discipline and requirements placed on the specialists are higher because the engineering services were formed long ago. New personnel are thus evaluated according to stricter criteria. In turn, the responses of the experts from enterprises in other cities (128 percent) convince us of the effectiveness of training engineers for them through the plant-VTUZ.

What the Student Costs

The student in a plant-VTUZ costs the state less than a student in a day higher educational institution does--we came to this conclusion as a result of an analysis of expenditures on the training of one engineer.² What comprises these expenditures?

Training expenditures: the wages of the teachers and partially other personnel of the plant-VTUZ and plant specialists--for guidance of engineering and production training, deductions for wages, office and business expenditures, money for acquiring books, and amortization of fixed capital. During a year these expenditures amount to 688 rubles for one student.

Payments to the students. These include stipends and payments for various vacations. In the first through the fourth courses (24 months) the students receive 46 rubles each (a total per one student of 1,104 rubles), and in the fifth course for 5 months--51.75 rubles (259 rubles). An average of 90 percent of the students receive stipends, that is, for the entire period of training, and 1,227 rubles are spent for these purposes.

Each year during the summer the students are given a vacation: 15 days are paid for on the basis of the average earnings (120 rubles) and 9 days--in the amount of the stipend. During all years of training 550 rubles are paid for these needs (7 months). The monthly paid training leave (100 rubles) is granted also for the examination session in the 10th and 11th semesters. Four months are allotted for preparing the diploma project (400 rubles) and so forth. During the 6 years the student is paid a total of 2,427 rubles, or 404 rubles a year.

The plant-VTUZ is responsible for expenditures for maintaining the dormitory (95 rubles per student per year) and the base enterprise (113 rubles). Approximately 25 percent of the students live in the dormitory. Let us note in passing that the students of the plant-VTUZ pay only 1.5 rubles a month or 18 rubles a year (8 percent of the actual cost of the housing) for living in well-arranged dormitories with all the conveniences and two-four people per room in the apartments.

And so 1,144 rubles are spent annually for training one student in a plant-VTUZ, and on an average for the country--1,100 rubles.³ Expenditures for one student in a plant-VTUZ during 6 years of training amount to 6,864 rubles.

If one were determining the national economic expenditures on training one specialist in an ordinary day VUZ there would be no more to this calculation. But the students of the plant-VTUZ, because they work in material production, create an added product which should be subtracted from the amount of national economic expenditures. If we do this we will see that for training one engineer in the "plant-VTUZ" system the state spends 3,336 rubles, that is, approximately half as much as in day VUZes.

Along with the economic effect, the "plant-VTUZ" system also produces an undoubted social effect. Its most important feature is the formation of a communist world view in the students not only through the efforts of the instructors and public organizations, but also those of the labor collectives of the base enterprises, which have rich revolutionary, military and labor traditions. Participating in the fulfillment of the production program and experiencing the atmosphere of production relations in the labor collective, the students undergo labor education. And for working youth of the enterprises the VTUZ students are a clear example of rapid professional growth and social advancement toward more complicated and responsible kinds of labor. There is a reciprocal ideological cultural and technical enrichment between the students and the labor collective.

The plant-VTUZes create for the young workers and graduates of secondary schools good opportunities and moral and material stimuli to acquire a higher technical education. The standard provisions concerning the plant-VTUZ envision that during the period of training with leave from production the students continue to be workers at the base enterprise and that this time is included in their work tenure (a total of 6 years). Another incentive is the stipend paid to all successful students, which is increased by 15 percent as compared to the day VUZes. The material support for the students of the plant-VTUZes is an average of 2.5 times higher than in day VUZes. They have all the rights of students of day VUZes and also the rights of workers and employees of the base enterprises.

And, finally, if this system of training develops, the plant-VTUZes will play an essential role in improving the social-class structure of the socialist society and increasing its social homogeneity. So far the "entry" into the intelligentsia is not the same from various social groups. Youth who have been reared in families where the parents have a higher educational level, as a rule, fill the ranks of the intelligentsia more intensively.⁴ This is true of ordinary VUZes. In plant-VTUZes the picture is different. An analysis of the materials of their admissions committees shows that an average of 55-60 percent of those who are admitted come from families of workers and children of workers. This corresponds approximately to the proportion of the working class in the social structure of our society (61.2 percent).⁵

Since training in the plant-VTUZ is one of the forms of training specialists without leave from production, all of the individuals admitted to the plant-

VTUZ become workers of the base enterprise. Thus the "plant-VTUZ" system envisions social movement (for 4 years) of youth who have been accepted from various social origins as part of the working class. The plant-VTUZes can without exaggeration be considered the higher educational institutions of the working class.

Problems and Prospects

The great responsibilities of the "plant-VTUZ" system are far from being fully utilized. We are speaking not only about the fact that it is less widespread than it deserves to be, but also about the organizational difficulties of realizing its advantages. The plant-VTUZes were created on the basis of the decree of the USSR Council of Ministers of 30 December 1959 and the standard provisions concerning the plant-VTUZ which were adopted in June 1960. Many fundamental provisions reflected in this decree and developed in the standard provisions are crucial today as well. But the plant-VTUZes have developed, and the documents concerning them have been "preserved" at the 1960 level and are impeding their development. Thus the decree rigidly regulates the time periods for the alternation of training with and without leave from production. Life has proved that this postulate is erroneous. It is sufficient to stipulate only the general time period of training with leave from production. The optimal system for alternating training and work can be established only taking into account the specific features of the base enterprises. At plants with a single type of production, where high individual mastery is required of the workers, it is acceptable to alternate a year of training with a year of work. For mass production in junior courses a more suitable system is "a week of training and a week of work." In senior courses when all of the students are assigned engineering and technical duties and the incomplete work cannot be transferred to someone else, the periods of training and work should not alternate so frequently.

Following the example of the plant-VTUZ at ZIL, in all plant-VTUZes the students of the first course should be relieved of production activity and devote all their time to study. It is necessary to take into account the fact that many of them enter the VTUZ while they are still minors and the base plants cannot hire them for work in their selected specialty. Moreover, when the students in the first course devote all their time to study they adopt more quickly to the training process.

In certain plant-VTUZes the students are trained without leave from production for a year (evening system). But the normative documents do not extend to them various privileges of evening students, for instance, leave for taking examinations.

There is not a clear enough stipulation of the responsibility of the base enterprises for the material and technical support of the plant-VTUZes and the organization of the engineering and production training of the students, particularly, granting them, in keeping with their specialty, the necessary number of work positions in junior courses and engineering and technical positions in senior courses. Perhaps the republic ministries of higher and secondary specialized education should conclude agreements with the base enterprises concerning mutual commitments for the development of the plant-

VTUZ for a period of 5 years, approved by the branch ministries. If the base enterprises failed to fulfill their contractual commitments one would raise the question of the expediency of the further functioning of the VTUZ at the given enterprise.

There is some doubt about the very name of "plant-VTUZ." For this is a system of training and not the name of a higher educational institute, which traditionally reflects the profile of its specialties. Apparently one should rename the plant-VTUZ at ZIL to be the Moscow Automotive Construction Institute at ZIL, and the one at Rostsel'mash--the Institute of Production Organizers at the Rostsel'mash Plant, and so forth. The ZIL has repeatedly applied to the USSR Minvuz requesting that the existing standard provisions be revised and that the plant-VTUZ be renamed. Unfortunately, there have been no results.

The fact that the training and methodological load on the instructors averages 25-30 percent higher than for those in day VUZes is a serious impediment to the development of plant-VUZes. The staff of plant-VUZes is formed according to the norms of day VUZes, but their specific features are not taken into account. The fact is that all of the students in a plant-VTUZ are broken down into two classes so that the work in the base enterprises will be continuous. And this means that the lectures and all the other duties with the students working on various shifts are doubled. The management of the engineering and production training of students at base enterprises also requires additional expenditures of time and efforts on the part of the instructors.

The peculiarities of this form of training should be reflected in printed lectures, textbooks, and training and methodological aids. It is difficult to understand why the State Publishing House has deprived the plant-VTUZes the right to publishing activity in spite of the standard provisions.

In recent years recognized scientific-pedagogical workers and industrial managers have made interesting suggestions regarding improvement of the "plant-VTUZ" system and has written articles in the central and Moscow press.⁶ They are convinced that along with training engineers according to the ordinary system in technical VUZes of the country and improvement of evening and correspondence forms of training, it is necessary to equally develop higher education in plant-VTUZes. They should be oriented toward special-purpose training of skilled personnel for specific branches of industry. In the opinion of P. D. Borodin, who for 20 years was the general director of ZIL, "more than 12 years of experience in training specialists according to the 'plant-VTUZ' system for the Moscow Automotive Plant imeni I. A. Likhachev shows that a combination of theoretical training with productive labor is very effective. It makes it possible to educate highly skilled specialists with a high ideological and political level. It would seem that the many years of successful experience of the plant-VTUZ should be carefully studied and one should consider the possibility of expanding this kind of training as the most effective kind for the enterprises."⁷

In our opinion, in the future it would be quite possible to create plant-VTUZes at the largest production associations which are the leading ones in terms of science and technology in the automotive and tractor industry (GAZ,

VAZ, KamAZ, and the Chelyabinsk and Kharkov tractor plants), in heavy machine building (at Uralmashzavod) and in other branches. But the USSR Minvuz does not plan to open new training institutions of this type. Up to this point they do not have a unified management center for this form of training. The ministries of higher and secondary specialized education of the RSFSR and other union republics, where plant-VTUZes are "drowning" in the overall mass of training institutions, naturally, cannot devote sufficient attention to them or render effective assistance. To be sure, in 1978 the USSR Main VUZ created a scientific methods section, "Problems of Training Students in the 'Plant-VTUZ system,' and in 1981 the Scientific and Methodological Council was transformed. Under the leadership of the training and methodological administration of the USSR Minvuz it studies and generalizes advanced experience in this area and coordinates the activity of plant-VTUZes since they are under the jurisdiction of various departments, and it also develops provisions and scientific-methodological materials. But this is no longer enough since this agency is operating on a public basis.

The "plant-VTUZ system" can develop not only through opening new training institutions, but also through expanding existing ones. The latter have begun to train specialists both for base enterprises and for the branch or the region as a whole. Certain plant-VTUZes have already begun such training. The RSFSR Minvuz is considering one other direction for the development of this system in which only some of the students of the ordinary day VUZ are trained in it. In certain day institutes they are intending to open departments for training in individual technological specialties (of course, in regions where there are large base enterprises of the corresponding profile). This area will not require significant capital expenditures. But it is necessary to have an essential organizational restructuring of the training and educational process and the existing psychology of educators, especially in profiled departments.

Unfortunately, the experiment with the plant-VTUZes has been extended for more than 2 decades. It is time to carry out more actively the justified expansion of the "plant-VTUZ system" along with the development of other forms of education.

FOOTNOTES

1. The base enterprises for which the plant-VTUZ at ZIL trains personnel are at the production associations ZIL, AZLK and the First State Bearing Plant.
2. We used the methods of A. B. Daynovskiy with additions that take into account the specific features of training in plant-VTUZes and the production activity of the students. See: Dyanovskiy, A. B., "Ekonomika vysshego obrazovaniya" [Economics of Higher Education], Moscow, "Ekonomika", 1976.
3. "The USSR National Economy in 1982," Moscow, "Finansy i statistika", 1983, p 381.

4. Rutkevich, M. N. "Intelligentsiya v razvitom sotsialisticheskom obshchestve" [The Intelligentsia in a Developed Socialist Society], Moscow, Politizdat, 1977, pp 60-61.
5. "The USSR National Economy in 1982," p 7.
6. The decisions of the Inter-VUZ Scientific-Methodological Conference-Seminar of Plant-VTUZes (April, 1978); the All-Russian Conference on the Problem "Professional Self-Determination and Establishment of Young Specialists in the Process of Training in the VUZ" (April 1980); the First All-Union Conference "Scientific and Technical Cooperation of the 'Enterprise-VTUZ'" (December 1980); Zhurakovskiy, V., "The VUZ Shop in the Plant," IZVESTIYA, 21 September 1983; Smirnova, N., "The Decisive Point--Love of Labor," LITERATURNAYA GAZETA, 10 March 1982 and others.
7. "A Continuation of the Leninist Tradition," MOSKOVSKAYA PRAVDA, 3 September 1983.

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FUTURE TECHNOLOGIES ANTICIPATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 149-155

[Article by Yu. P. Voronov, candidate of economic sciences, division chief of EKO: "With an Orientation Toward Future Technologies"]

[Text] In the modern VUZ the engineers are not trained for any particular job. The students and even the teachers do not always have an idea of what knowledge will be needed in the production activity. As a result production receives not so much the needed specialist as a "cat in a bag." And the attitude toward him is as follows: he can be assigned to carry out the duties of a technician or be used in some other function, but not as an engineer.

The "plant-VTUZ" system is another matter. The ZIL has 17 specialized branches. Each student who arrives to study these areas will have a future specialization. Why familiarize him in detail with casting if in the future he will be engaged in cold stamping? It is better immediately to study in depth the theory and the latest achievements in stamping. This pertains not only to the training, but also to the work of the student at the base enterprise where they send him to the shop of the head plant which corresponds most closely to the work of the branch. For instance, students from Roslavl are sent to the facility for standard parts, and those from Ryazan are sent to the main forging shop. During the time of training, in keeping with the plan for individual training, they change their jobs two or three times. For example, in the department for processing metals with pressure there are 250 students, each of whom from the third through the 11th semester, taking into account the specific features of production, climb the ladder of positions. There are also mandatory ones among them: production organizer, technologist-designer, equipment mechanic. During the training time the students become familiar with all of the shops of the plant and study the technology of related productions.

The general technical disciplines are taught in amounts corresponding to the courses in traditional VUZes. Class lectures in the specialization are augmented with independent studies on the part of the students. Methodological aids for them are in a form similar to that of the program textbooks. A large proportion of the independent work presupposes stricter control.

The students regularly take quizzes on the material they have covered. For each semester there is a program of engineering production training and detailed semester assignments which are broken down into several subassignments. Within each of them it is pointed out what the student must do and what his leader must do. Each student is assigned to a particular manager for practice. Most of the progress in studies is achieved not only in the lectures, where they elucidate only the key problems, but also during consultations (there are quite a few of these for each course) answers to questions and practical activity.

Most of the problems with the students arise during the first three courses and after the fourth the students have basically found their place in production and are "accustomed" to the people. By this time their immediate supervisors have a certain idea of how best to utilize the given student as an engineer. The curator from the plant-VTUZ can tell sometimes down to the week when the student has become a part of the labor collective and has "become necessary." After this time it becomes more complicated for the instructors to work with the students. Not more difficult, but actually more complicated. Now they actively disagree, proving the correctness of their own approach to the solution to any practical problem. It is nice for the educator to see the results of his hard work, but the thought always flashes in his mind that it would be much more peaceful to deal with students who "keep their mouths shut and listen." It is good that many instructors of the plant-VTUZ are not familiar with any other type of training and therefore accept the independent (sometimes excessively so) student as the only type there is.

All of the diploma projects of the students are realistic, they meet the needs of production and, as a rule, they are introduced. Nobody ever takes a notion to write a project from a previously defended diploma or from literature. From his first engineering work the individual become accustomed to introducing ideas, and it seems unusual to him to begin to work in the abstract. And psychologically this is very important.

The instructor rarely has a chance to sit quietly in his office. His daily work includes visiting the shops and talking about the work of the students. Most of his time is taken up by individual work with the students. The load is enormous and it is not commensurable with the ordinary activity of instructors in the traditional VUZ. Moreover, the lectures have to be given twice since during the time when one-half of the students are studying the other half are working in production. And still the calculation coefficient by which the number of teaching personnel is determined in the plant-VTUZ is the same as it is in other VUZes in the country.

The instructors are constantly in the midst of the current production problems of the base plants. They know the instructors well here. Direct contacts with managers of the sections and shops augment the overall warm feelings toward the plant-VTUZ on the part of all production workers--from the laborer to the general director. Here is a concrete example of the concern of the production workers for the students and teachers. The departments of the institute conduct a large amount of research work. The research frequently requires powerful equipment. Take this problem: it is necessary to obtain a

multiton press at the station and bring it back to the laboratory and install it. In a traditional VUZ this would involve a multitude of confusing procedures. But in the plant-VTUZ it is enough to submit an order for the automated machine, a crane and a brigade of riggers (as is done in any shop).

The institute has good relations with the plant but one cannot ignore the objective difference of interests either. In particular, the foremen and shop chiefs are usually not given incentives for planned movement of students from one job to another. "One should not turn the shop into a way station"--is their argument. The situation is mitigated by the fact that many managers themselves were graduates of the plant-VTUZ and therefore from their own experience they recall the difficulties of engineering and production training and the undoubted need to change to various jobs. If a person is learning to be a body worker and is working as a lathe operator, the very idea of bringing training and production closer together turns out to be discredited. Now there are practically no such cases in the plant-VTUZ, although sometimes situations arise in which the student cannot leave a particular job because of the production necessity. Sometimes the institute gives in, retaining the student longer than necessary in his previous position. It is rare, but it happens that a student misses a lecture because he has been asked to work overtime.

When disseminating the experience of the plant-VTUZes and expanding the numbers of them and their sphere of activity, the main things are not to hurry and to make the decision after careful weighing of all the pluses and minuses. It would be expedient to contrive a system of differentiated training of engineers. In this connection there is interesting experience, for example, in Hungary. In order to become a plant engineer there it is necessary to study for 4 years, and to become an engineer with a diploma--5 years. Naturally, the plant engineer is not given 500 hours of mathematics because he has no need for this amount. One of the main goals in the Soviet higher school when training engineers is to establish a creative basis. Graduates of the plant-VTUZ at ZIL go mainly into production. But nonetheless the proportion of creative people among them is very high. In practice many of them are constantly engaged in efficiency work and have authors' certificates.

Sometimes one occasions to hear conversations about the fact that the reason for the not always correct utilization of the engineers is their "overproduction." Educators of the plant-VTU~ at ZIL have a different opinion. In the higher technical school it is necessary to increase individual work with students. Individual selection proceeds naturally from this. The youth who are more capable of research receive recommendations of how best to use their talents which are manifested during training and in the first steps of mastering production. This is one side of the coin; the other is the unallowable luxury of training engineers for a position where a higher education is not required. Unfortunately, no research is being done yet which would evaluate the number of jobs that require the amount of training received in a VUZ.

First it is necessary to determine correctly the needs of personnel, and on the basis of this, to plan differentiated training of engineers. Under the conditions of the plant-VTUZ the needs of production are obvious, they need

only be consistently taken into account. To work on orders from the plant means to live the life of the labor collective and to accept its concerns as one's own.

One can hear many laudatory words about the plant-VTUZ and its graduates. But, as in any matter, the system also has its shortcomings. For instance, the students of the plant-VTUZ have an objectively small amount of free time. They are clearly overloaded. During a work week the students of the plant-VTUZ are employed at the enterprise for 41 hours, in training--12 hours, and in independent work--6 hours. During the examination period they spend 9 hours a day in independent preparation, and when preparing for exams without being released from work (plant-VTUZ) they spend 3 hours, or during the entire period of training in the traditional institute this amounts to 1,840 hours, and in the plant-VTUZ--1,636. For independent preparation during the period of theoretical training the students of traditional institutes have 2,660 hours, and in the plant-VTUZ--2,359, that is, 12 percent less. And here it is sometimes necessary to hold back those who are especially enthusiastic so that they do not forget about rest and their own health. The high training load requires strong health and a good nervous system. The teachers themselves encourage the students to engage in sports.

If one more of the semesters with weekly alternation between training and work were used for training alone, the students would have 486 more hours for independent preparation. There would be a change in the ratio between training with and without leave from production in the plant-VTUZ at ZIL: four training semesters, two work semesters, five semesters with an alternation of "a week of training--a week of work" and one more semester (training) for diploma projects. But such a decision would involve revising the long-outdated normative documents that regulate the development of the plant-VTUZes.

As has already been said, the educators also have a large load. The modern higher technical school has been constructed on the ratio: one educator for 12 students. This is acceptable if they do not engage in individual work. But in the plant-VTUZ most of the educational activity is based precisely on this kind of work. Therefore it would be desirable if here they were to have no more than eight students per instructor. Otherwise at the plant-VTUZ at ZIL the educators are not able to handle the individual work of all the students who are guaranteed to become intelligent, creatively thinking engineers. The remainder are turned over to one degree or another to their own will power and conscientiousness.

And one more serious shortcoming. When they encounter production beginning with the first days of training the students see it from various sides, without embellishment. Frequently they become accustomed to the old technology and organization of production, and to the old policies, and they become familiar not with future, but with already installed equipment, which has frequently been in operation for a long time. And yet the engineer must be the leader of scientific and technical progress. Perhaps it should be arranged so that the students come into production not alone, but in groups, and then their individual innovation will be reinforced by joint discussions and collective opinion. One young person can be educated much more quickly by

production than by teachers. These groups or brigades of future engineers could be called landing parties of scientific and technical progress (the military terminology only emphasizes the importance of the task facing them).

The first such brigade of students (for the development of the GAP on the basis of a rapid automated press) was created in the department for high-pressure metal processing at the plant-VTUZ at ZIL. The department is headed by the initiator of this form of training, doctor of technical sciences, Prof O. A. Ganago. He has worked for 20 years in traditional VUZes and for the 13th year now he has been in charge of the department at the plant-VTUZ.

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TRAINING FOR NEW TECHNICAL EQUIPMENT SUMMARIZED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 155-158

[Article by O. A. Ganago, doctor of technical sciences, head of the Department for Processing Metals Under Pressure of the Plant-VTUZ at ZIL (Moscow): "Preparing Groups for New Technical Equipment"]

[Text] The existing system for training engineers, which took form in the 1950's and 1960's, is oriented toward technical equipment which has already been in service for 20-30 years and more. This technical equipment is not sufficiently mechanized and requires a large number of operators, repair service personnel, and, consequently, also engineers. Graduates of the plants-VTUZ at the ZIL are oriented mainly toward the positions of foremen, repair workers and technologists. But now more and more automated lines and robot equipment complexes are appearing at the base enterprises. Flexible automated productions (GAP) will be introduced in the near future. Their productivity is many times greater than that of the existing forge and press machines. Next will come the creation of complexes with so-called "human-free technology." Then there will be a sharp reduction in the need for workers, including engineers, but the requirements for their occupational training, on the contrary, will increase many times over. All this presupposes in-depth restructuring of the existing system for training personnel.

Let us consider this problem using the example of the training of engineers for the forge and press production, assuming that an analogous situation is inherent in other technological specialties. In cooperation with the Voronezh Production Association for producing forge and press equipment imeni M. I. Kalinin and other organizations, associates of our department for processing metals under pressure created a principally new operating mechanism for eccentric presses (eccentric-circular). It has been patented in the United States, Great Britain, Italy, the FRG and other countries. The application of this mechanism in presses that are specialized for performing heavy stamping work (separating operations, bending in a stop, chopping, calibrating and so forth) provides essential design and technological advantages.

In 1977-1983 the VPO for Forge and Press Equipment imeni M. I. Kalinin produced more than 300 presses for separating operations: seven modifications, including rapid automated presses (100-500 moves per minute

with the force of 100 tons). The automated presses with these specifications were assimilated for the first time in the USSR. Plants of the automotive industry acquired them for producing filters (perforation of openings) and cutting parts of the "iron stator" and "iron rotor" type, that is, for performing millions of operations. A total of three of these automated presses were produced. No new clients were found. The main reason for the rejection of the new equipment was its excessively high productivity! The automated machine completes the plant's program in a couple of days, and the rest of the time it must stand idle....

The way out of this paradoxical situation lies in the creation of an automated complex on the basis of a special automated press with means of rapid readjustment of stamps, devices for feeding in blanks and for removing parts and scraps. Work on the creation of such a complex (the Module GAP-Press-1) continued the research of associates of the faculty for processing metals under pressure. Preliminary calculations show that several of these modules can replace a shop for sheet stamping of small and medium-sized parts at the largest automotive plants in the country, and also in tractor, agricultural and other branches of machine building. The basis of the creation of the module (GAP-Press-1) is advanced technology, the latest original design for the special automated press, special designs for stamps, automated devices for feeding in blanks and removing prepared parts and waste. In keeping with the program, specialists of various departments of the plant-VTUZ at ZIL will be enlisted in its development: automatic equipment, computer and measurement equipment, machine parts, resistance of materials, technical mechanics, graphics and so forth. Additionally, creative and production ties will be established with many scientific research institutes, VUZes and enterprises under the programs for the GAP of the RSFSR Minvuz and the USSR State Committee for Science and Technology.

The work that has been started on the research, planning and, in the future, also the introduction of the GAP complexes requires a serious breakdown of the established views on the activity of the higher school and the creation of new organizational scientific subdivisions which combine the activity of several departments, the allotment of staff, equipment, areas, financing for the work and so forth. Above all it would be desirable to develop with the management of the base plants concrete long-range plans for training specialists who are oriented toward the introduction and operation of the latest technical equipment which is coordinated with the plans for the development and reconstruction of the association. The plant-VTUZ should essentially take orders for training groups of specialists who are professionally and psychologically prepared for the introduction of the GAP in one shop or another. Moreover, the output of these specialists should be timed for the beginning of the installation of the equipment.

These groups (brigades) should be formed even in the junior courses, selecting the most capable and hard-working students who are inclined toward research and design work. The graduate students should be informed in detail about these peculiarities of the training and the nature of the future work. The number of students in these groups should be reduced. But they should be trained according to special training plans which are completely oriented toward specific training of specialists who are capable of creating and

operating GAP's. One cannot forget about the reequipping of laboratories either. They need modern equipment and instruments as well as the first models of the GAP's. They should be transformed into testing grounds for the creation, adjustment and introduction of new technical equipment. It is necessary to sharply (up to 50-60 percent) increase the volume of laboratory and practical work. It is precisely in these laboratories and design bureaus as well as on the testing grounds that the students become familiar with the latest technical equipment which they will subsequently bring to the base plants.

It is also necessary to change the nature of the training and scientific work of teachers and to transform the subdivisions of the institute which are engaged in the creation and introduction of the GAP into unique scientific training complexes whose activity is subordinated to the creation, adjustment and introduction of new technical equipment and the training and retraining of personnel. Such subdivisions, in our opinion, should be singled out from the existing structure and placed directly under the jurisdiction of the rector of the institute or the prorector for scientific work. The students who train in these groups should be paid a larger stipend, and upon completion of the VUZ should be paid greater wages. Naturally, it is necessary to change over to such a system of training gradually, along with the "maturation" of the departments and the creative groups who are capable of introducing their own developments and not simply adjusting "someone else's" technical equipment.

But the overall graduation of students from the plant-VTUZ should be reduced somewhat, turning the training of foremen, economists and certain other specialists over to the VUZes.

This kind of restructuring of the system for training engineers will meet modern requirements of production and considerably raise the prestige of this category of workers.

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EXPERIENCE FROM JOINT ACTIVITY RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 158-162

[Article by V. V. Kalinin, deputy general director of the ZIL Production Association for Personnel (Moscow): "From the Experience in Joint Activity"]

[Text] Modern production is being influenced by the rapid development of new areas in science and technology. There is a correspondingly rapid change in the needs for specialists. For instance, the designing and research on bodies of motor vehicles has been singled out into an independent specific area of technology, but the corresponding specialists are not yet being trained by a single VUZ in the country. Engineers for repair and operation of equipment, machine tools and instruments, planning and designing adapters and technical fittings also need special education. The preparation and output of a new motor vehicle with a diesel engine in our association involved extensive utilization of automated lines, robot equipment, machine tools with numerical program control and other complicated equipment with electronics, pneumatic and hydraulic systems. New technological processes are being introduced for producing parts made of plastic and composition and powder materials. Where does one find the personnel? This is a crucial problem for many enterprises. ZIL is solving it successfully thanks to its plant-VTUZ.

During all the years of its existence the plant-VTUZ has trained more than 6,000 engineers for the association, including 653 for branches in other cities. It has helped us to cope relatively easily with the problem of training and retaining personnel in the branches, where basic construction capacities are now being introduced as a result of reconstruction. We promptly determine the need for personnel at each branch plant in another city. If there is to be a considerable increase in the number of engineers, along with workers of the VTUZ we conduct preparatory work among the youth, including among school graduates in the corresponding cities and their environs, and we open up preparation courses and consultation points. With the permission of the USSR Minvuz in some of these cities an admissions commission of the plant-VTUZ conducts entrance examinations. All of the students must be sent from their plants. Those who have successfully gone through the competition are officially accepted for work at the head plant and sent for training in VTUZ.

For practical leadership of the engineering and production training at ZIL, under the administration for engineering and technical personnel there is a bureau of young specialists, and in the plant-VTUZ--a division for engineering and production training.

Before being sent out to work the students of the sixth course are certified by special commissions which include the managers of the structural subdivisions of the plant, instructors in the profile departments and representatives of public organizations. They evaluate the engineering and production training and give a conclusion about the possible utilization of the graduate. At the same time sociologists of the administration for engineering and technical personnel discover the individual desires of the young specialists to be employed in one activity or another.

All this is important both for the students themselves and for the association which receives the trained personnel. It is noteworthy that the graduates are retained well in production and that they advance rapidly in their jobs (Figs. 1-2).¹ Now 50 percent of all the engineers with diplomas and more than 75 percent of the engineers in the line personnel of the production shops of the Moscow Automotive Plant imeni I. A. Likhachev are graduates of the plant-VTUZ. They comprise the backbone of the engineering services and all of the branch plants in other cities. The plants of our association in Roslavl, Mtsensk, Ryazan and Yartsev are a kind of body of personnel for these cities.

Students of the plant-VTUZ are not a burden for the plant, but are the most stable and disciplined category of workers. The labor training they have received has a positive effect in all of the affairs of the students, regardless of where they may work. Thus in 1983 only one out of three construction divisions of the VTUZ--Zilovets-83 (33 people)--under exceptionally difficult conditions for a short period of time laid 1,200 meters of concrete road, constructed the foundations of two residential buildings, and did capital repair on three calf barns. During the summer the attachment assimilated 222,000 rubles, and all three construction detachments--520,000. Additionally, the students participate in efficiency and invention activity of the plant, sports competitions, artistic independent activity, people's militia, and they act as leaders in Pioneer camps and so forth.

The plant-VTUZ has organically become a part of the destiny of the automotive plant personnel: they work with the students in the shops and divisions or guide their engineering and production training, while others perform scientific research work in conjunction with students of the VTUZ, they are studying in it now or have graduated or increased their qualifications there, and someone--man or wife, children or grandchildren, is a student of this higher educational institution. Its teachers, associates and students have extensive access to palaces of culture and libraries, sports installations and health and medical institutions of the base enterprises. The children of the students and teachers attend plant kindergartens, have recreation in Pioneer camps and teachers and associates of the plant VTUZ obtain housing on the same basis as the plant workers.

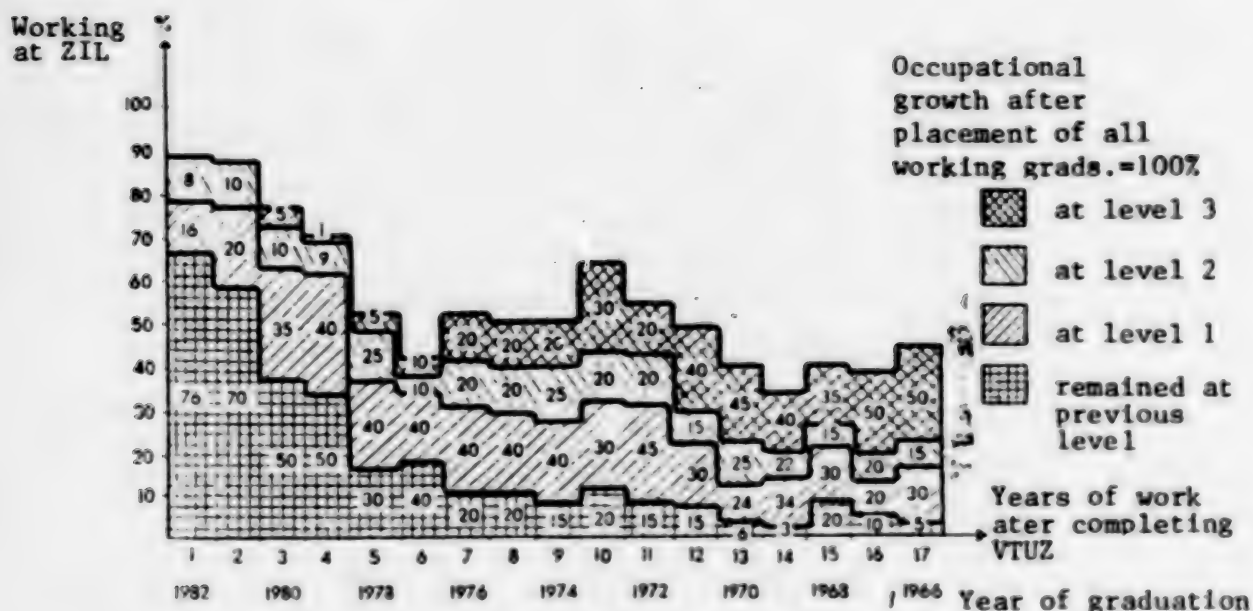


Figure 1. Assignment and Professional Growth of Graduates of VTUZ at ZIL Working at the Moscow Automotive Plant imeni I. A. Likhachev

At the beginning of the 1970's the plant constructed a complex of training facilities with an overall area of 18,500 square meters for the plant-VTUZ, rendered it assistance in supplying the laboratories, and fully took on responsibility for servicing the premises. In recent years, with the help of the plant, a computer center has been created in the VTUZ, which has four computers, two classrooms, equipped displays, and other computer equipment. But the opening of the new specialties requires expansion of the areas for laboratories and offices. Therefore in 1984 ZIL gave the plant-VTUZ an additional building with an area of 3,500 square meters. Further expansion of the training areas is planned.

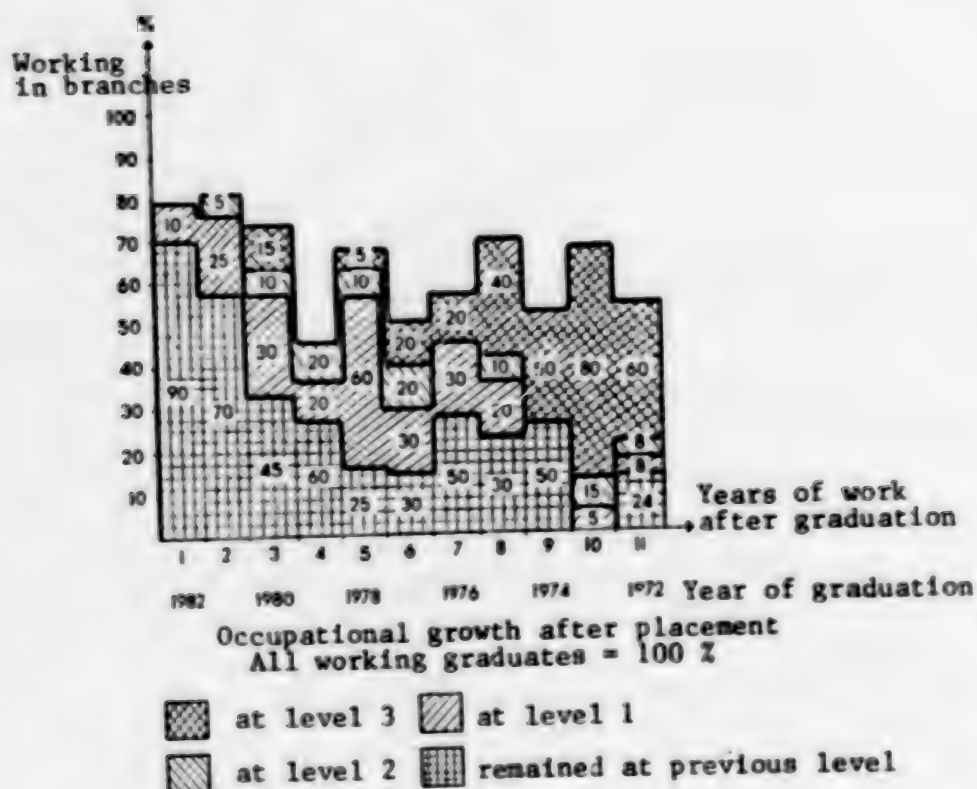


Figure 2. Assignment and Occupational Growth of Graduates of Plant-VTUZ at ZIL in ZIL Branches (Mtsensk, Roslavl, Ryazan)

The experience in joint work of ZIL and the plant-VTUZ shows that effective work of a higher educational institution of this type depends largely on the actual assistance given to it by the base enterprises and on the ability to arrange interaction between the structural divisions of the plant and the VTUZ. At the same time, the plant-VTUZ is necessary for harmonious development of the production association.

FOOTNOTE

1. When processing the data we did not take into account specialists who had been transferred from the plant because of being advanced to a management post.

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DEPUTY GENERAL DIRECTOR INTERVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 163-166

[Interview with Yu. I. Lazarev, deputy general director of the Production Association "First State Bearings Plant" by Yu. Nikol'skiy: "A School of Managers"]

[Text] [Question] It has been 15 years since you completed the plant-VTUZ at ZIL. Could you compare your training with that of the graduates of traditional VUZes? Now, after three five-year plans of engineering work, which form seems to you to produce better results?

[Answer] Training at the plant-VTUZ is quite substantial and reliable. Before receiving a diploma the future specialist has an idea of his professional duties. In ordinary VUZes the situation, as a rule, is the opposite. Graduates of the plant-VTUZ advance rapidly in production. There are many of them among the managers of our association, for example, the head technologist, V. P. Petrov, the head mechanic, G. F. Mitichkin, the chief of the administration for quality control, N. S. Anichkov, and other specialists.

[Question] But the plants need both managers and rank-and-file engineers, designers and technologists.

[Answer] Designers who have completed the plant-VTUZ also advance more rapidly along the job ladder than graduates of other VUZes do.

[Question] To which positions do the graduates strive most?

[Answer] Before answering this question I wish to mention one tendency that has been observed among young specialists. Among a good part of them there is an attraction to the peaceful life. The beaten path of lovers of peace and quiet is through the service of the head mechanic and energy engineer into the technical safety division, the BRIZ, the division for technical training and the norm-setting service. I am no way hinting that the people who work there do not love their work. But still it is more peaceful there than it is in basic production. We think that it is bad if a line manager comes to his post having managed to become accustomed to a calm tempo. We try to make the path to becoming line managers go through the positions of foreman and deputy shop

chief. Neither one of these posts is a gift: the pay is low and it is necessary to stay on the job after hours almost every day. The foreman is the occupation which has the most critical shortage. There are approximately 830 of them at the plant. This is the backbone of the management system and its buttress. Therefore the requirements for the foremen are higher than the average for workers of the enterprise. Unfortunately, the turnover of foremen is still greater than average. So the plant-VTUZ renders us invaluable assistance in filling the vacancies in this category of workers.

[Question] Do you wish to say that graduates of the plant-VTUZ are less drawn to the peaceful life?

[Answer] It is not only a matter of that. With close contact between the training institution and production it is easier to select graduates who are suitable for the position of foreman. The desire to be a manager is usually not manifested until the work process has started. But the ability to manage people is predetermined to a considerable degree by character traits. A student is not a newborn child, he is psychologically developed, and his character and silent behavior have taken form. Changes are difficult, and sometimes altogether impossible. Therefore it is necessary to have a consistent selection and testing of each one.

In keeping with the order from the general director of our association, each student must work as a foreman during his training time. Before defending their diploma projects all of them are given a production description. It indicates whether or not the gifts of a manager have been discovered in the student. Without this certification he is not assigned to a specific engineering position.

[Question] Does this entry mean that the graduate must be sent to work as a foreman or only that he has the right to occupy this position?

[Answer] Neither one. Having noted that the individual has the gifts of a manager, the description can recommend to industry and to the individual himself that he try to work in management positions.

The student of the plant-VTUZ, having worked in the process of training for about a year as a master, has a clear idea of the everyday responsibilities. But a graduate of an ordinary VUZ rarely has a chance to see the drama of the drawing up of the ordinary everyday assignment, the rapid calculation of labor expenditures, not to mention the adjustment of these for the specific worker or the fact that he must think about the course of the technological process not in general, but for the available resources and personnel. The first year is especially difficult. After working for a couple of years as a foreman almost everything that was complicated previously seems ordinary.

[Question] Did you work as a foreman as well?

[Answer] I will relate it in order. After school I went to study in a technical school to be a lathe adjuster and completed it in 1959. And I did not receive the diploma from the plant-VTUZ until 10 years later. This is a long time, of course. But I know, and not only from my own experience, that

haste in obtaining a higher education is good for theoreticians, but there is little advantage in it for production workers. Later they will have to finish learning those work methods which appear different in textbooks or perhaps are not even mentioned.

I worked as a foreman for several months even while I was a student. In the fourth course I was employed in design work. After 2 years I was appointed a deputy shop chief for technical problems. In this position, in my opinion, I went through the basic school of management and gained the ability to work with people. Throughout my life I have remembered what it means to set a personal example and constantly place high demands on oneself.

[Question] What seemed especially difficult to you in your first management position?

[Answer] The psychological aspects of work with people. After you have organized people several times to carry out an urgent assignment, ideas about human psychology cease to be abstract. Another difficulty was everyday concern about reducing labor-intensiveness.

[Question] And what difficulties do you recall during the time of training?

[Answer] It was necessary to study a lot, especially mathematics, in order not to fall behind the others. I was aware of the fact that I had entered the VTUZ 5 years after completing school. But after the third course special disciplines and technology began, and everything changed radically. Any lecture, seminar or independent studies became visible and familiar, not at all because of the pictures. It is easier to study after going through the school of production.

[Question] What would you like to note of the peculiarities of training in the plant-VTUZ?

[Answer] We students did not have the problem of additional earnings: to half-time wages were added half of a stipend which turned out to be about 100 rubles. This was enough. In the junior courses I worked as a welder-repairman of the fourth category with time-rate payment. If I needed money I would have changed over to piece-rate, as the students with families did.

[Question] Did it not seem to you during the time when you were working in various management positions that your colleagues who had graduated from traditional schools were superior to you in terms of the level of professional knowledge?

[Answer] This was not the case even once. The plant-VTUZ gives good theoretical knowledge. But the main thing is that it is forgotten much more slowly.

[Question] Let us return from the past to your current affairs.

[Answer] I am now working as deputy general director of the Association for Reconstruction. We develop production at the sites which are equal in size to

the available area of our association--the first-born of the Soviet bearing industry. I have to handle everything: the construction site, the equipment, the personnel. And even now the new industry performs part of the work on orders from the basic industry. The time is not far away when it will be operating at full force and it will help to take the load off the older areas.

When I manage to resolve some important problem on the spot without any serious mistakes I know that I am obligated to no small degree to the plant-VTUZ that educated me.

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GRADUATES DISCUSS EDUCATIONAL EXPERIENCE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 166-168

[Article: "The Graduates Speak"]

[Text] V. A. Eksanov, deputy head metallurgist for casting of ZIL, graduate of the plant-VTUZ at ZIL, 1967: I came to the plant in 1962 on a Komsomol pass as a worker in the foundry and then was transferred to the plant-VTUZ and I was never sorry that this is where I graduated. Hardly anywhere else is it possible to arrange such an effective link between theory and practice. The theoretical material is reinforced directly in the work station, and in the labor collective. The students enter into the technology and equipment even in the process of training, and they come to the shop with sufficient labor and technical training. They are "their own people" there, and do not waste time on adapting. I do not know of any essential shortcomings in the system of the plant-VTUZ. The minor shortcomings are temporary in nature and are related mainly to the fact that it is an innovative form of training and the institute itself is very young, and also there is a lack of the so-called "school" and deep traditions. But this will come with time.

V. S. Lizunov, candidate of technical sciences, docent of the plant-VTUZ at the ZIL, secretary of the party bureau of the automotive department, graduate of 1970: Living next to ZIL among the adults who worked there, even as a schoolchild I did not envision any other path for myself. I entered the plant-VTUZ after completing the craft school at ZIL and after having served in the army and worked at the plant. At the VTUZ my first teacher and mentor was Prof A. A. Ignatov. Under his leadership I engaged in scientific work. Perhaps too much is said about student work, but it is distinguished from the traditional work in that we ourselves introduce the results at the plant where we work. We deal with concrete production problems. This work has brought a great deal of moral satisfaction and motivated me to study theoretical material more deeply.

Having become acquainted with students from other technical institutes during my time of training I was impressed by their lack of knowledge of interrelations in labor collectives. In discussions of global problems they seemed better prepared and more erudite than we did, but when it came around to concrete issues related to management of the collective and production,

they would remain silent, sometimes hiding behind an indifferent attitude toward these problems. Apparently this largely explains the desire of many graduates of traditional VU es to find jobs in scientific research institutes, and if at a plant--then in the design bureau or the divisions.

After completing the plant-VTUZ I was offered a position in the department. I am working on a theoretical justification for the creation of highly productive and reliable forge and press equipment.

Ye. S. Kuz'min, chief of the head forging shop, graduate of 1976: Having completed the auto mechanics technicum of the Moscow Gorispolkom with distinction in 1966, I did not intend to enter an ordinary day VUZ because there were four children in our family. I wanted to work and enter the evening division of MADI. But then I found out that at ZIL there was an institute which makes it possible while training in the day division to have sufficient material support. During the first three courses I earned 90-110 rubles a month, including the stipend. After the third course I was elected a deputy and then the chairman of the Komsomol organization of the VTUZ. This, of course, had an effect on the fact that after completing the institute I was elected first the deputy and then the secretary of the Komsomol committee of ZIL, and at the 28th Komsomol Congress--a member of the Komsomol Central Committee.

The plant-VTUZ system has immense possibilities for ideological influence on working youth. The example itself is important: the student-worker. Komsomol organizations of the VTUZ and plant are equally responsible for the training of the students for work in production. It is important to make sure that from the first courses they consider themselves true members of the large plant collective and live with its interests, and the graduates try to go into the basic production.

A. I. Svetlanov, engineer-designer, graduate of 1981: I entered the plant-VTUZ immediately after school. The most difficult thing was to learn to combine training and work. But I overcame this difficulty in one semester. In my opinion, an immense plus of this form of training is that the knowledge acquired in the institute is used right here in production. I was sent to the administration for design and experimental work of the ZIL. When I arrived there I experienced no timidity because as a student I had worked for a year in this collective. The collective helped me to find myself and to figure out my new job.

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EDUCATION AT LENINGRAD METAL PLANT DISCUSSED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 168-178

[Article by G. S. Shchegolev, professor, Plant-VTUZ at the Leningrad Metal Plant: "The Plant's Training Shift"]

[Text] The Leningrad Metal Plant (LMZ) by the beginning of the 1930's had become the flagship of domestic turbine construction. At that time many small and sometimes even large subdivisions of it were headed by practical workers--at best with a secondary technical education, and sometimes simply leading workers who were very familiar with their trade. But their knowledge and experience was not sufficient for producing new turbines. Highly skilled specialists who had mastered modern theory were required. There was no time to wait until the younger generation came from the institutes. And the higher school was not preparing graduates who were capable of taking the reins in their hand immediately. They needed more time to master production.

The party organization of the plant decided to organize an institute right at the enterprise in order to make it possible for planned personnel to obtain the necessary knowledge without leave from production. This initiative was approved by the first secretary of the Leningrad Party Obkom, S. M. Kirov, who called it "an initiative of extreme importance." In 1930, by a decision of the High Council of the USSR National Economy, a plant-VTUZ was created on the basis of the Leningrad Metal Plant.

Managers of subdivisions and leading workers became its students. Lectures in general theoretical disciplines were given by instructors of day institutes of Leningrad, and in special disciplines--those few specialists with higher educations who worked at the plant. Of course, the organization of the VTUZ was not a simple matter. It was necessary to select the appropriate schedule for the work and training of the students, to draw up special training plans and programs, to open up a laboratory and so forth. But at that time there were not so many mandatory rules, provisions, requirements, instructions and forms concerning the institutes as there are today. The VTUZ had the necessary independence in making decisions, and it experimented and attracted the necessary specialists.

Gradually among the students there began to be a prevalence not of technicians, as was the case at first, but workers with secondary education. As a rule, these were quite independent people who had felt the need for a higher education in order to solve the problems that were arising in their reality. They had firmly determined their future specialty and had a clear idea of the work in which they would like to engage after completing the VTUZ.

In the shops nobody especially looked out for the students or took care of them. They simply worked, gradually becoming a part of the collective. Many of them later had to work at other enterprises and in institutes, but power machine building remained "theirs" forever. In my opinion it was precisely the production activity during the time of the labor semesters that determined the life path of the future specialists. Herein lies the most valuable quality of the plant-VTUZ system, of which hardly anybody thought during the time of its creation--the complete adaptation to production during the years of training.

I began training in this VTUZ after I was already a designer. Therefore after my first practical work at the plant (second course) I was assigned a position of a designer in the bureau for preparing for production. It was here that I came to the conclusion that the role of the shop engineer consists primarily in improving production. I recall how I planned an adapter for making round openings on drum boilers and was surprised that this had not been done earlier--for it was so simple to make them and it put an end to the troubles.

At that time the design bureau for hydraulic turbines was working on the plan for the second GES of the Volga Cascade--the Uglichskaya. The designer, S. A. Granovskiy, had designed a rubber bearing for it with aqueous lubrication: not babbitt and not bronze, but rubber, and not oil, but water! At that time I was not yet a specialist in hydroturbine construction. I was introduced to Granovskiy several years later--he was in charge of my diploma project. But even in the second course I plunged into the problems of the plant and the branch as a whole and became familiar with the specialists both personally and from what they had said. And this was not without consequences.

Not Number, But Ability

From 1930 through 1941 the VTUZ graduated a total of 568 specialists. In 1941 it was disbanded. Diploma projects of the last graduating class before the war had to be defended at the Leningrad Polytechnical Institute imeni M. I. Kalinin.

The plant-VTUZ did not graduate many engineers during the prewar years, but what specialists they were! I shall name only a few of them: the chief of the Main Administration of the Turbine Industry, I. K. Nazarov; the head engineer of this administration, S. I. Berzin; the director of the Kharkov Turbine Plant, M. I. Boychenko; the head hydroturbine designer of this same plant, a winner of the State Prize of the Ukrainian SSR, N. N. Robuk; Hero of Socialist Labor and winner of the State Prize, head engineer of the LMZ, P. S. Chernyshev; three-time winner of the State Prize, deputy head designer of hydroturbines at LMZ, S. A. Granovskiy, winner of the Lenin and State prizes, head of the department of hydraulic machines at the VTUZ, V. M. Orgo, and

others. Perhaps this group is no accident, but, rather, they represent a pattern. These people even when they were students had decided to devote their lives to the branch and, I repeat, the entire graduating class was insignificant compared to the overall number of specialists who were graduated from traditional institutes during this same period.

Now it is difficult to discover the reasons for disbanding the VTUZ. Probably there were problems with staffing the plant with personnel and difficulties arising with finding the necessary contingent of students. The management of the VTUZ, apparently, could not overcome them. And disputes about the plant-VTUZ system have not died down even today. Sometimes it seems that when discovering the slightest hitch even today there are people who would be willing to eliminate it. They are still talking about the experiment which is taking place in the school--combining training with production. But, after all, more than 50 years have passed since the organization of the first plant-VTUZes. How much time will it take to complete the experiment?

I have the impression that the plant-VTUZ or the plant-branch of the VUZ appear only when there is a shortage of personnel. Then the powerful forces of industry, which has an immediate need for labor resources, go into action. For example, at the KhTZ a similar situation has now arisen--and at the enterprise there immediately appeared a branch of the Kharkov Polytechnical Institute. As soon as the shortage decreases, the VTUZes recede into the background into industry.

And the USSR Minvuz remains passive: it does not impeded the existence of this form of education, but it does nothing to encourage its development either. It is hardly an accident that the leaders of this ministry, in pointing out in their speeches how crucial it is to strengthen the tie between the higher school and industry, seem to forget about the experience of the plant-VTUZes. It is as though they did not exist in the system of higher education. And yet it is the direct responsibility of the Minvuz to give, finally, an objective evaluation of the plant-VTUZ system or whether to develop it or whether to abandon it. It has long been time to complete the experiment.

A Second Birth

The second birth of the VTUZ at the Leningrad Metal Plant dated from 1960. It was brought about by another intraplant shortage of specialists and also a large task--to train personnel for other enterprises in power machine building: The Nevskiy Plant imeni V. I. Lenin, the Izhorsk Plant imeni A. A. Zhdanov, the Proletarskiy Plant and the Plant for Turbine Blades, and also for the Central Boiler Turbine Institute imeni I. I. Polzunov. At the request of the Ministry of Power Machine Building a faculty for increasing the qualifications of engineering and technical personnel was opened up at the VTUZ and it is still operating successfully. Along with combined training (alternation of day and evening semesters) an evening faculty has been organized.

Now the plant-VTUZ trains engineers not only in its own traditional specialties (steam, gas and hydraulic turbines) but also in reactor

construction, the technology for cold and hot processing of metals, and welding.

Each year 400 students are accepted for the combined form of training, and 250 for the evening form; these are mainly schoolchildren and graduates of vocational and technical schools. This composition of students has required changing the conditions for study and work. For the first three semesters the students only study, and in the fourth they begin also to work in the shops. Graduates of the schools, as a rule, do makeshift work, but the people who have graduated from vocational and technical schools are immediately entrusted with machine tools. During the subsequent semesters the day and evening forms alternate. This system helps the recent schoolchildren to become accustomed to lectures and practical and laboratory studies. But also during the first three semesters the students become familiar with the base enterprises to which they are assigned immediately when they enroll in the VTUZ. To be sure, it is as though this familiarization takes place on the side.

The VTUZ has 24 departments, in which there are 20 doctors of sciences and professors, and more than 100 candidates of sciences, of whom about 70 are docents. The staff has a total of more than 200 instructors. Additionally, specialists from the base enterprises are enlisted.

The Level of Theoretical Training

In the 1970's the proponents of traditional forms of training came out in favor of eliminating the plant-VTUZ. To be sure, unsuccessfully. The fact is that it is located in Kalininskiy Rayon of Leningrad. Also located there is the Leningrad Polytechnical Institute (LPI). The plant-VTUZ and LPI have the same specialties. Is such justification justified? To which does one give preference? There are still no exhaustive answers to these questions.

In the opinion of professors at LPI, the plant-VTUZ at the Leningrad Medical Plant trains engineers with a technological inclination and a lower level of theoretical training than is acquired at "classical" institutes. But they think that such engineers are needed in production. Is it true that the theoretical knowledge of engineers of the plant-VTUZ is lower than that of graduates, say, of the Leningrad Polytechnical or Moscow Energy Engineering institutes? Let us compare the training plans of these educational institutions in terms of the specialty they have in common, "hydraulic machines and means of automation" (see table).

A comparison of the training plans shows that they are different not so much in terms of the general theoretical disciplines as in terms of the special ones. The difference is explained by the specialization that is given, the traditions of the institutes, the composition of the instructors and so forth. But, as we can see, there can be no talk of any narrowness in the training of engineers in the plant-VTUZ.

At the same time to think that technological preparation lowers the overall level of theoretical knowledge means simply to underestimate the influence of modern technology on the development of the national economy. Modern technology must be based on the latest achievements of science. And it would

seem that the plant-VTUZ should be reproached for the opposite: its training plan does not include enough technological disciplines (although such a reproach would also be appropriate for the other two institutes that are being considered). But in the plant-VTUZ this shortcoming is compensated for by production practice, which during the entire time of training amounts to 3,108 hours (as compared to 1,050 and 840 hours at the LPI and MEI). And moreover it is practice which does not simply illustrate the lesson, but is organically combined with it.

Table--Training Plans for Specialty "Hydraulic Machines and Means of Automation" of the Three Institutes, Hours*

<u>Disciplines</u>	<u>Plant-VTUZ</u>	<u>LPI</u>	<u>MEI</u>
Marxist-Leninist philosophy	90	90	135
Scientific communism	80	80	93
Fundamentals of Soviet law	24	32	34
Foreign language	210	210	221
Economics of the branch	85	85	64
Organization and planning of production	131	108	121
Higher mathematics	510	561	425
Programming and application of computer equipment	102	99	178
Physics	272	262	289
Chemistry	102	85	85
Descriptive geometry and drawing	187	168	--
Theoretical mechanics	187	180	170
Resistance of materials	187	165	--
Electrical equipment	153	114	113
Introduction into specialty	34	34	51
Mechanics of liquid and gas	170	215	168
Technology of hydraulic machines	98	30	60
Total required hours of study	5138	5375	5174
Production practice	3108	1050	840
Number of course projects	5	6	7
Number of quizzes	51	52	52
Number of examinations	45	46	48

* The table does not give the subjects for which the number of hours is the same in the three institutes or disciplines that are taught in one or two of them. But the total takes into account all subjects.

The Link Between the Higher School and Production

Now many people are speaking about the scientific research work of students, increasing the volume of research and bringing the subject matter closer to the needs of industry. In my opinion, one can observe a kind of spasmodic tug toward strengthening the link between VUZ science and production. On this level I should like to return to the prewar years.

In spite of the fact that there was a VTUZ at the Leningrad Metal Plant, many leading specialists of the enterprises did not teach in it, but combined jobs and taught at the Leningrad Polytechnical Institute. A couple of years later

several of them went to work there permanently. For example, the corresponding member of the USSR Academy of Sciences, I. N. Voznesenskiy, who had worked at one time as the head designer at the LMZ, later was in charge of the department of hydraulic machines at LPI. He was replaced by Prof A. F. Lesokhin, who had previously been the chief of the calculation division of the hydraulic turbine bureau of this plant. After Lesokhin the department was headed by the corresponding member of the USSR Academy of Sciences, N. N. Kovalev, who was previously the head designer of hydraulic turbines at LMZ. In this same position we have also seen the former head designer, A. A. Lomakin.

It would be possible to give a long list of eminent engineers who have taught at Leningrad Polytechnical. This was the case during the postwar period as well.

Then there was no need to establish a link between VUZ science and production. It existed of its own accord, and the leading specialists were source of it.

But the time came when the USSR Minvuz adopted the decision to eliminate the combination of jobs. At first this had no effect on the separation of the higher school from production since the traditions and personnel who had come from industry remained. But gradually this breach took place.

The higher school provided itself with its own personnel. The good students remained in the departments and defended first one and then another dissertation.... I certainly do not wish to say that such professors are not worthwhile. As a rule, they are people who are capable of excellent mastery of the theory of a subject. But where can they get a sense of the needs of production? They know of them only from conversations and individual appeals from the enterprises, but they do not live with them. Of course, this is not their fault, but the fault of the system that has been created.

In my opinion, the enterprises need not young specialists who are striving for scientific research work but engineers who, having mastered good theoretical knowledge and a sense of the new, understand the demands of the branch and are able to apply and quickly introduce the achievements of science. For now industry is suffering not from a lack of new ideas, but from their slow implementation. By the time it is introduced the idea is sometimes outdated, and all the work turns out to be in vain. The plant-VTUZ is called upon to prepare specialists who are up to these tasks.

Some of them will later become scientific workers, but this is later, and far from all engineers will become scientists. And this is not necessary.

Instructors of the plant-VTUZ have to visit the enterprises frequently, communicate with their specialists, and organize and supervise the practice of the students. They are naturally included in the problems of the plants and the branch. Whether they want to or not they will be in step with production!

More and more frequently in the press there appear announcements like: "The Pozitron NPO has created a ramified training network in which the specialists are trained according to individual plans, attend special courses and a

'school for the young engineer.' There is a base faculty of the Institute imeni V. I. Ul'yanov (Lenin)." It is similar to a plant-VTUZ: the goal is acceleration of adaptation and the method is the school of the young engineer and the base faculty. But at the same time it is not a plant-VTUZ. So is it not time to generalize experience and select and introduce everything that is progressive? One gets the impression that everyone is rushing toward production, but each in his own way, and God forbid that it be the same way that his neighbor has taken....

Unsolved Problems

At the time the problems in the plant-VTUZ system are being solved inadmissibly slowly. As before, the enterprise are interested in students who will undertake practice as workers. They are always needed. Workers, but not engineers. The situation has changed, and so has the attitude of industry toward the plant-VTUZ, but the organization remains the same.

Peripheral plants of the Ministry of Power Machine Building are very interested in graduates of our VTUZ. And this is understandable: they not only master the theory, but have also gone through labor and engineering practice at a leading enterprise. But the VTUZ cannot accept students from other cities: it does not have a student dormitory. Trivia? No. The Kharkov Turbine Plant has tried for several years to send its students to Leningrad. Without success. As a result it has organized its own branch department of the Kharkov Polytechnical Institute.

There exists the opinion that since the institute can use the laboratories of the enterprise it has no need for its own. In consider this wrong. In the plant laboratories the students, like the staff workers, conduct research which is a part of the overall work of the enterprise. At that moment the plant needs not students, but laboratory workers. This means that the students must learn to conduct this research in the training laboratories of the VTUZ.

Unfortunately, decisions concerning the development of the institute are frequently made by people who have nothing directly to do with it. Therefore it is necessary to spend a lot of energy and time on proving simply and obvious things. And the result is far from always positive. The fact is that our plant-VTUZ has dual jurisdiction. For training, staff and personnel problems it is under the jurisdiction of the Ministry of Higher and Secondary Specialized Education of the RSFSR, and for economic purposes it is under the jurisdiction of the Ministry of Power Machine Building. It is hardly necessary to explain that these issues are closely interwoven.

Certain problems, say, construction, including of such a necessary thing as the dormitory for students from out of town, rely also on local agencies. As a result, the VTUZ of the Leningrad Metal Plant, although it has been born twice and has recently celebrated its 30th birthday, has no normal training building and lacks many necessary laboratories and a dormitory.

For some reason the Minvuz is against organizing a graduate school and a specialized training council at the VTUZ. The plant-VTUZ does not have its

own printing base for publishing methodological aids. It is necessary to go "outside" and insurmountable barriers sometimes arise there. I shall give only one example. In the first course of our VTUZ (like, incidentally, in other institutes) we offer the introduction into the specialty. In spite of the apparent simplicity, this course is poorly grasped by the students who have not yet gotten away from school traditions. The training material is spread out in many books and the new student is not capable of conquering them. A small brochure is needed. But it turns out that it is practically impossible to publish them. The number of copies is small and therefore the Minvuz will not include it in the plan for publishing training literature. Attempts to publish it as a popular brochure depend on the policies of the State Committee for Publishing: the author must first document the possibility that the entire edition will sell rapidly. As a result, they have simply ceased to print books on many technical issues, and the issues that are in the libraries have long been outdated. So the students are left alone with their study plans, which they cannot completely understand in the first course.

Certain problems pertain not only to plant-VTUZes, but also to all higher and secondary specialized training institutions. Perhaps the main one of these is the quality of the training of specialists. The system is arranged in such a way that the institutes are forced to cling to almost every student. First it is necessary to fulfill the admissions plan, regardless of anything else. To do this it is necessary to go to the schools and talk to the students about how interesting it is to be engineer, what attractive tasks await him after completing the institute. Then it is necessary to retain a certain number of those who have been admitted since dropouts threaten staff limitations and, possibly, the closing of one specialty or another. Then there are endless conversations about the fact that it is necessary to raise the level of teaching. "Of course, one must give the student a D if he deserves it, but still the teacher is guilty of the D"--this is the inevitable result of considerations. A sad result. The question of a D in the entire system of education has become simply paradoxical. By giving it the teacher is causing unpleasantness to himself, the faculty and the deans. The student seems to recede into the background: it is not so much a matter of his knowledge as it is a matter of various kinds of indicators. Everyone forgets about good students. Frequently none of the deans will look them in the eye. Never. They are all engaged with poor students and "poor" teachers....

I had occasion to visit some Canadian schools. They have solved this problem in their own way: they do not have an unsatisfactory grade, but there is something else--"needs to improve knowledge." But this is not a D. The student can still be promoted to the next grade. In the end he receives a special certificate saying that he has attended the course of the secondary school. Such a graduate can read, write and he is not illiterate, but that is about all. In order to change over to the next stage of education he must complete secondary school again. It is not only Canada where such an approach is typical.

The fuss about the poor pupils and students takes attention away from those who are succeeding. Capable people, as a rule, make their own way to knowledge and can do without mentors, but then the level of education still drops.

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MAIN ADMINISTRATION GIVES OPINION OF VTUZES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 178-179

[Article by Ye. I. Kazantsev, chief of the Main Administration of Technical VUZes of the RSFSR Ministry of Higher and Secondary Specialized Education (Moscow): "The Opinion of the Main Administration of Technical VUZes"]

[Text] The plant-VTUZ system is one of the progressive forms of training engineers. Of all the methods of cooperation between VUZes and enterprises, in comparison to other forms of training specialists without leave from production, in this system the principle of combining training and education with productive labor is realized most fully and consistently.

The plant-VTUZes train skilled specialists in a broad profile who are familiar with modern production and its prospects. Conditions are improved for the labor education of the students and the periods for adaptation of young specialists in production and the turnover of engineering personnel are reduced. In the RSFSR Minvuz there are now six plant-VTUZes, of which two are independent higher educational institutions (the plant-VTUZes at the ZIL and at the Leningrad Metal Plant), and the rest have the status of branches and faculties. The Main Administration of Technical VTUZes of the RSFSR Minvuz considers it expedient to further expand the training of specialists in the system of plant VTUZ. In what form?

Let us say that a large, technically leading base enterprise constantly has a significant need for engineering personnel in the corresponding oblast (kray). The enterprise is in a position to create the necessary material and technical base for the VTUZ, to help it in the organization of the training process, and to provide work for the students in keeping with the training plans and programs. In this case a branch (faculty) of an authorized VUZ can be opened on the base, with training of specialists under the system of the plant-VTUZ.

When specialists are trained in plant-VTUZes the involved ministries must participate actively (including materially). A questionnaire of many union

ministries and leading VUZes of the republic which was conducted by the Main Administration of Technical VUZes showed that they are interested in the development of such a system. The RSFSR Minvuz is studying their proposals.

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DISCUSSION OF PHYSICAL FITNESS CONTINUED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 180-195

[Article by N. N. Dombrovskiy, biologist (Alma-Ata) and M. N. Levina, journalist (Novosibirsk): "When We Have very Little Time"]

[Text] What We Need To Know About the Pulse

The pulse is a wave which is set in motion by the heart. The pulse informs us of any change taking place in the organism. It tells us about the body temperature, about how fast you are burning energy and utilizing oxygen, whether your organism is eliminating wastes normally and how quickly your muscles will go to work. The pulse can also tell your mood. It combines all of these phenomena, "weighs" them and gives an overall signal which notifies you about your general condition. The frequency and strength of the pulse beat changes several times during the day. It reacts to everything: food, sleep, work, emotions....

You must learn to tell the four parameters of the pulse so that it can become your faithful assistant in exercises: first--the force of the pulse under the pressure of the fingers. Second--the volume or expansion of the artery. When you are in good physical shape the volume increases and you feel that the artery is becoming softer and more elastic. Third--the regularity of the strength of the beat and its rhythm. As you get into good physical shape the pulse becomes stronger and more regular. And the fourth parameter is the frequency of the pulse. When you are in good shape the frequency of the pulse decreases.

When you are at rest your pulse gives you important information about the condition of your health. An accelerated pulse rate in and of itself tells you nothing. It means only that the organism is working with a load. The power of the organism is measured by the work it can do at 120 pulse beats per minute. If in order for your pulse rate to reach 120 beats a minute it takes very little effort, this means that you are not in shape, most likely because of inadequate physical activity.

Look at the table, and it will show you approximately the pulse rate that is achieved with continuous exercises of various intensity.

<u>Exercises</u>	<u>Pulse rate</u>
Very, very light	Less than 90
Very light	90
Light	100
Fairly light	110
Moderate	120
Fairly heavy	130
Heavy	140
Very heavy	150
Very, very heavy	160

The pulse rate depends on emotions in the same way as it depends on physical exercises. But physical exercises are not accompanied by increased emotional loads unless it is in competition, and therefore the pulse here is a reliable indicator of the intensiveness of the exercise. The pulse rate during exercise is not dependent on the pulse rate at rest. Whether your pulse rate at rest was 60 or 80 beats per minute, exercise will raise it to 120. If the pulse rate at rest was more than 120 beats, it will be the same during an easy walk. If the pulse rate speeds up this can be an indicator of recent physical activity or a disease. Possibly you have recently drunk coffee or been nervous. If these factors are lacking and the pulse is still high, it is not impossible that you have tachycardia and you should go to a cardiologist for advice.

In order for the heart to beat more slowly at rest it must beat more rapidly during exercise. Exercises strengthen the heart and at a lower rate it will work better. Outstanding athletes sometimes have a rate of heart contractions of less than 40 beats per minute. This frequently amazes cardiologists and leads them to the idea of cardiac pathology. But in fact this pulse rate for certain people is normal and should not be a counterindication of physical exercise.

From time to time the heart needs to be overloaded so that at the necessary moments its muscles and vessels can react quickly and effectively to changes in the conditions. To do this it is sufficient to gradually increase the frequency of the pulse to 120 beats per minute and to maintain it at this level each day for a couple of minutes. Lighter exercise is better than none at all, but it is still insufficient for productive training of the heart. We shall not give here the author's detailed calculations through which he came up with precisely 120 beats per minute as the optimal rate of heart contractions for training the heart. They are based on extensive work by a large group of physiologists and cardiologists, but we wish to warn you: a higher rate of heart contractions is not an indicator of better training; if the heart is not in very good condition, the increased frequency of its contractions will not be commensurate with the increased physical condition.

For the majority of adults the maximum heart rate is equal to an average of 220 beats per minute minus the age. But this is not an ideal indicator, but a theoretical evaluation of the maximum pulse rate during exercise for people at

various ages. If you are far from being in good shape, to begin with it will be useful to make certain small efforts during an ordinary walk.

In order to prepare the heart for carrying out the program it is necessary to establish several parameters of physical readiness. If, for example, you are 50 years old and you have decided to exercise for the first time, to begin with it will be enough for you to have a load which will increase the pulse rate to 110 beats per minute. If you have been training and are in fairly good condition, you might begin not with 160, but with 180 beats minus your age, that is, 130 beats per minute. And if at 50 you are in excellent condition and wish to train with a full load, it will not harm you to use the rate of 200 beats minus 50, that is, 150 beats per minute--this is your optimal load. There is no point in increasing your initial load: it is doubtful that it will be of further advantage for your health. When you reach the first goal you can increase the rate of training. It is bad to reduce the rate since this will result in your losing your physical condition.

It is possible to achieve fairly good results in a month, and they will be registered in the reduction of your pulse beat at rest. A reduced rate of heart contractions is a barometer of your physical endurance and readiness for physical activity.

The Pulse Test

First of all it is necessary to certify that your present condition makes it possible to begin the program of physical training without harm to your health. It is best to find out from a doctor whether there are any misgivings about the condition of your health. The basis for misgivings can be:

pain in the chest;

dizziness or syncope;

gastrointestinal disorders;

difficulty breathing;

cold symptoms.

If you are capable of walking 3 kilometers without experiencing any special difficulties you can begin the exercises. In order to gain a better idea of your physical condition it is necessary to take your pulse during various kinds of loads. Physical exercise should cause not tension, but satisfaction. To test this you need a watch with a good second hand and a tape measure in order to measure the height of the step that is going to be used for the test.

In order to calculate the speed of the pulse per minute it is not necessary to count it for an entire minute: it is sufficient to count the pulse for 30 seconds and then multiply it by 2. Dr Morehouse suggests his own more economical method: count the pulse for 6 seconds and then add a zero to this. The 6-second count has its own advantages when calculating the pulse during

loading since the rate can decrease during the minute and the count will be wrong. The count should be started with the figure 0 and count the number of beats in 6 seconds.

The test has six stages. The first stage measures your pulse at rest. The second stage--the same thing, but when you are standing. The third, fourth and fifth stage determine the reaction of the organism to a light load. The sixth stage shows the speed of restoration after the load. It is best to take the test a couple of hours after eating, smoking or drinking, when the pulse is always accelerated. One should especially avoid coffee. One should not even talk during the test since this also increases the frequency of the pulse. The only time when you can discover your pure natural pulse rate is right after waking up. The pulse rate when sitting is close to normal and therefore a chair is a quite suitable "station" for measuring the pulse. When measuring the pulse you must remember that agitation and an irregular rhythm of respiration can influence the frequency of the pulse. In order to measure the pulse correctly it is necessary to be as relaxed as possible, avoiding the slightest tension. The legs should not have any weight on them, and all of your weight should press toward the floor, with your shoulders falling freely. Even your face should be relaxed: do not wrinkle your brow, blink your eyelids or press your lips together.

Having done all of the preparatory procedures, you must take your pulse again. It will not be difficult for you to determine that the rate has dropped appreciably. If in spite of your efforts the pulse rate has not decrease or is close to the figure 100, you must attempt to relax again. If the condition of the pulse has satisfied you, you can go on to the next step.

Orthostatic Endurance

After sitting for a short time the organism should adapt to the vertical position. Stand calmly for a minute and try not to strain or move. After a minute is up, take your pulse. The difference in the pulse between the sitting position and the standing position is the main indicator of the level of your current physical condition. A difference in the pulse rate of more than 20 beats means that you should see a doctor about the condition of your health. If your pulse causes no misgivings but you feel faint or dizzy while standing, this is a signal that you must pay more attention to your health. Good physical training does not guarantee the ability to have endurance in a nonmobile condition. If standing increases the pulse rate by approximately 10 beats, you may consider that you have passed this test and you can go on to the third step.

Step 3 is the first of a series of 1-minute exercises on the depth of stairway. As we have already said, the height of the step must be measured with a ruler. In the attached table you will find the weight of your body and draw a line between it and the appropriate height of the step. For example, a woman weighing 67 kilograms on steps that are 20 centimeters high will walk at a speed of 30 steps per minute.

The test itself is very simple: walk up with your left foot and then your right, and then down with your left and then your right. Repeat the exercise

as many times as is indicated in the table. Try to carry out the assignment for exactly a minute. Within 15 seconds you will be able to judge whether or not you have done the required number of repetitions. If you begin to feel bad, stop the exercise.

Table--Speed of Ascent, Steps Per Minute

<u>Body Weight, kg</u>	<u>Height of steps, cm</u>					
	<u>18</u>	<u>20</u>	<u>23</u>	<u>25</u>	<u>28</u>	<u>31</u>
100	30	30	30	30	30	30
45	30	30	30	30	30	30
54	30	30	30	30	20	20
63	30	30	30	20	20	20
72	30	30	20	20	20	20
81	30	20	20	20	20	20
90	20	20	20	20	20	20

Symptoms of pure endurance: the desire to abandon everything, to reduce the rate, exhaustion, sweatiness, difficulty breathing, increased heartbeat, pain or cramps in the leg. It is necessary to consult with a physician. Once you have stopped sit down and take your pulse. If you feel tired and your pulse exceeds 120 beats per minute, the results are not good: you have poor endurance but you can still engage in the exercises.

If the aforementioned symptoms have not appeared and after exercise the pulse has not increased to more than 120 beats per minute, move on to the fourth step. Immediately repeat the 1-minute test, sit down and take your pulse. If it is equal to 12 beats in 6 seconds, stop. If it is less, move on to the fifth step, that is, repeat the exercise again. Take your pulse. The standards are identical to steps 3 and 4. The counterindications are also the same.

The sixth step is testing the speed of recovery. After having gone through the fifth step sit and take your pulse, and a minute later take your pulse again. The difference in the pulse at the end of the exercise and after a minute of rest should be no less than 10 beats.

Results: if your pulse has reached 120 beats a minute with a minimum load, you are in poor condition. But if the 120 beats were the result of testing at three stages of the test and you feel fairly good, you are in excellent shape. The proposed test cannot be used for diagnosis, but still it is a good indicator of the level of your physical endurance and suggests the point from which you must begin your individual program for achieving good physical condition. The program consists of two parts: the first is daily and the second is three simple exercises which you will do for 10 minutes three times a week, as the authors of the book promised you.

The Regime for "Minimum Maintenance"

At one time Dr Morehouse had occasion to conduct research in order to figure out why Air Force pilots have the shortest active career in the United States.

Physiologists gave the most varied causes: vibration, harmful gases, low oxygen in the aircraft and even fear of flight. It turned out that it was not the conditions of the flights, but the conditions of incorrect rest after the flights that put the organisms of the pilots in a disordered condition. A large part of those deviations from the physiological norm which we observe in ourselves and in our acquaintances are caused by inactive recreation: for every exertion we try to reward ourselves with hours of laziness and as much excess as we can allow ourselves.

In order to acquire or restore our good condition it is not at all necessary to go into major sports. Competition generates stress, and stress can have grave consequences for a person who is not in good condition and is burdened with cares. The program for good physical condition begins with a determination of the level of training you intend to achieve. If you are satisfied with your condition and you want only to retain it, it is necessary to include the proposed program in your daily way of life. In this case even several heavy sacks of groceries can provide the "minimum load" for your muscles.

There are three levels of conditioning. The first level is the lowest, below which you cannot drop without damage to your health. The second is the general level, and it provides for the ability to adapt, including to unforeseen circumstances, and it makes it possible to go through the workday without excessive fatigue. The third level includes training for fairly difficult activity. If you are attracted by skiing as your basic form of physical load, then in order to achieve the third level you will also have to have a program of "pre-ski" preparation in order to achieve good results.

The second level--"general conditioning" requires no more than 30 minutes a week from you, as the authors promise. The first level--minimum maintenance of condition--requires only several good habits which must be followed every day.

Five pieces of general advice. You should learn:

1. To bend and unbend your joints to close to the maximum limit.
2. To stand on your feet for a total of no less than 2 hours a day.
3. To lift the maximum weight for you and hold it for about 5 seconds.
4. Increase the rate of your heart contractions to 120 beats a minute for no less than 3 minutes.
5. Burn 300 calories a day through physical loading.

You will not need either a stadium or any special time to meet these requirements. Going from store to store each day with heavy bags will help you to meet the first three points immediately. As for the first point, this is not difficult: each time when you must turn it do it without using your legs, turn around on your own axis. Do not be too lazy to bend over to pick up something that is lying too low or to reach for something that is too high.

All that is left is to meet the last conditions, but this is is not very difficult either. You have already met part of them if you have carefully followed the assignments of the first points. When coming home with your load from the store try, in spite of the weight, to walk briskly at a good rate, and raise your pulse to 120 beats without any special strain.

Now all you must do is burn 300 calories a day and you will carry out the minimum program. No special training is necessary to do this either. When you have a sedentary way of life any activity will burn up calories excellently. Even simply doing ordinary housework at an increased rate or taking the stairs instead of the elevator will result in a good feeling and increased physical readiness. It is possible to burn calories in other ways as well: work in the garden, tennis, walk in the forest--you should not limit your imagination and your habits.

And now remember one easy rule: never lie down if you can sit; never sit if you can stand, and never stand if you can be moving.

This is the main condition for fulfilling the program which we are gradually approaching.

The Program for the Manager

...It proposes a physical load intended especially for people who have mainly a sedentary way of life. They have very limited time, they are frequently left alone and they are forced to participate in abundant dinners and other meals, frequently against their own wishes. A full course of exercises for them requires training in three stages of 8 weeks each.

The first condition for fulfilling the program is increasing the muscle mass and supplying it with vessels. The muscle mass is needed in order to perform the work: to run, to ski or to play tennis. Then it is necessary to add strength to the newly formed muscle mass. One should not confuse muscle strength and muscle endurance. The former is the ability to raise a large weight for a brief moment, and the latter is the ability to continue to work for a fairly prolonged period. The exercises for achieving these different goals will also be different.

When should one exercise? The authors convince us that you can exercise any time you want to. It is better to train every other day: Monday, Wednesday, Friday or Tuesday, Thursday, Saturday.

A Couple of Reminders

In the first place, everything you will be doing is for your own good. It is no longer necessary to convince anybody that moderation and a lack of excesses plus physical loading are good.

Second, a correct start is very important. The final result will depend largely on the first week of exercises. This does not mean that you must

sweat blood. On the contrary, there is no haste and no overloading. In the area of physical culture excessive fatigue or pain are inadmissible.

Third, do not try to do as many exercises as possible during the several minutes that are allotted. You are not competing with anybody.

Fourth, take your pulse more frequently so as to know precisely how your organism is reacting to the load.

Fifth, do not be frightened if you gain a little weight at first. We have already discussed what this means: changes have begun to take place in your tissues. Muscle tissue weighs more than fat tissue does. In this stage trust your senses more than the scales.

Sixth, let your organism decide for itself which exercises are most suitable.

And the main thing is that you must feel good while doing the exercises and experience an influx of energy after them.

A Couple of Warnings

Try always to maintain the natural rhythm of your breathing and breathe freely. Do not dehydrate your body. It is generally necessary to drink more frequently, and before the exercises it is simply necessary to drink a glass of water.

Do not burden your heart with excessive loads. Before working out do light warmup exercises. Activity must be increased gradually--from very light (pulse 100) to moderate (pulse 120). The best warmup is to do the main exercises slowly and easily.

If you are jogging, then it is best to run downhill. Running uphill produces a greater load on the knees and can damage them.

And another warning: never stop immediately after doing your exercises. The organism cannot turn off this quickly and an abrupt halt sometimes ends with a fainting spell.

There is an ancient legend about an athlete who lifted up a newborn calf and continued to do this every day for a long time. The calf grew and along with it the athlete gained strength. The day came when he could lift an adult bull. It is not known how true this story may be, but the principle it illustrates is quite realistic. It is based on the biological law of adaptation.

Your program will not have full value if each time you do one and the same number of exercises of the same kind. Today you must do a little bit more than you did yesterday. This is the main principle of training. It is necessary to constantly regulate the intensiveness of the exercises. For example, in order to develop some particular muscle group it is necessary to begin with 15 exercises and try to increase them to 20.

The Pulse Rate During Training

...Is calculated by multiplying the difference between 220 and your age by 60 percent for the first period of training, 70 percent--for the second--and 80 percent--for the third. For example, if you are 40 years old the difference from 220 is 180. Multiply this by 60 and we receive 108. We round off the number to 110 and from the table we see what we receive (see table).

TTP is training pulse rate. TTP-1--pulse rate for first 8 weeks; TTP--2--pulse rate for second 8 weeks; TTP-3--for the third 8 weeks; and TTP-4--for the fourth 8 weeks of training--maintaining the level.

<u>Years</u>	<u>TTP-1</u>	<u>TTP-2</u>	<u>TTP-3</u>	<u>TTP-4</u>
Less than 30	120	140	150	150-160
30-44	110	130	140	140-150
45-60	100	120	130	130-140
More than 60	100	110	120	120-130

First Step

First week: 1. Stretching--1 minute. 2. Contraction of muscles--4 minutes. 3. Any continuous activity which increases the pulse to the desired level--5 minutes.

Stretching. 1. Stretch one arm upward as far as possible and try to prolong this pleasure. Do the same thing with the other hand. When stretching think about the similar movement of a cat.

2. The hands are extended to the sides, and the torso is turned to the side as far as it will go.

3. Bending over, grasp your knees from the back and easily bend your shoulders to your knees. There is no need to apply force or to take advantage of inertia--just a light effort.

4. Turn your head so that your chin is over your left shoulder. Place your left palm under your chin and grasp your head from the back with your right hand. Now, using both hands, slightly turn your head. Change the positions of your hands and turn the head in the opposite direction. Doing this exercise does not require sharp movements, and to begin with it is sufficient to do it just once.

Growth of muscles.

1. Pressing. Move away from the wall a little more than the distance of your extended hand. Raise your arm to the height of your shoulders and lean forward. Try to touch your chest to the wall. Push back. If the distance is too much for you and the exercise seems difficult you can come closer. The exercise should be done 15-20 times if it is not difficult for you. As soon as you have mastered it and it begins to seem too easy, move a little ways away from the wall and increase the number of repetitions. Another way is to

change the angle of your incline. You can use a stool to do this. When this position is no longer difficult for you either, move to the floor and do the exercise first on your hands and then with your knees off the floor. In order to make the exercise even more difficult, you can position yourself so that your legs are higher than your hands. The limit is when your legs are higher than your head but you will probably not be able to reach this level.

2. Sitting-lying. Sit on the floor with your toes hooked under the edge of some furniture. Bring your chest to your knees. Place your hands on your abdomen in order to feel the effect of the muscles and begin to lean back until you feel the load on your abdomen. Return to the initial position. This exercise also requires a gradual approach--the load should be light. If you leaned too far back and it is difficult for you to return to the initial position, lie on the floor and do it using your hands. As your condition improves the point of moderate effort will recede farther back until your shoulderblades touch the floor. Begin with the degree of effort which gives you the possibility of staying in the selected position for 15-20 seconds.

When you have gone through all the stages of the exercise make it more difficult by crossing your hands over your chest. This increases the resistance so much that you will have to begin again with 15 seconds for one time. The next stage is to put your hands on your head and, finally, your hands over your head. Attention: do not spread your arms out! By balancing with them you will make the exercise easier and this is not what you want to do.

Do not forget to take your pulse after each exercise. Check to make sure that it does not exceed the TTP of the first period of training. If this happens, rest for a while, repeat the exercise in the same order and take your pulse again. If at first you have been able to remain in the reclining position for no more than a second, this is normal. By doing the exercise regularly you will be able to get beyond the second mark. The exercise usually does not take more than 4 minutes. The 5 minutes remaining from the first two exercises will be used for the third part of the program.

3. "Jumps." You may select any form of activity you like which meets two conditions: continuity and the required pulse rate. Running in place meets these two conditions best, but it is boring, and jogging is not much more fun. Therefore it is suggested that the readers try a form of activity like dancing with elements of physical culture exercises. The only requirement for the dance is that it be continuous, energetic and that you like it. You can include several special movements in the dance: jump twice on your left foot and then on your right foot, and then both of them together. Repeat this. Select the music and the tempo for yourself. Check your pulse during movement. Do not stop. In order to find your own form, tempo and rhythmic of exercise it will take two-three sessions, and by the end of the first week you will have "your own" convenient physical exercise which you will subsequently only have to intensify.

The Second Step

And so the first 8 weeks are behind you and you already have muscle definition. Now it is time to teach them endurance so that no unexpected occurrence will get you off your schedule of exercises. The second 8 weeks of training have different goals, and this means that the exercises must be somewhat different. But if, for example, you have enjoyed the stretching you can use it for warmup.

1. Pressing. Do the same thing you did in the first cycle, but you will have to do everything in twice the volume and at a doubled rate. Not immediately, but approaching this goal gradually, and oriented toward changing the rate of the heart contractions.

2. Sitting and lying. The position is the same. Lean back to a approximately one-third the way to the floor and stay in this position for 15-20 seconds. Then lean back a little more and again stay in this position for 15-20 second. While reclining feel the muscles of your stomach with your hands--this will increase their tone and help you to stay in firm condition. When the effort is too much the muscles of the stomach will "quiver"--this is a signal to let up: you must lie on the floor, straighten out and allow them to rest.

As soon as you have completed the "sit-lie" again do the presses, and having done the presses, again do the "sit-lie" exercise. This will take 4 minutes. If this rate is unacceptable to you so far, do as many exercises as you can. Do not do everything at once. Check your heartbeat. Your upper limit now is no longer 60, but 70 percent of the 220 minus your age. This means that it is somewhere around 130 beats a minute if you are 40 years old.

3. Interval training. This is 6 minutes of exercise in which the intensive work is alternated with active rest. For example, 30 seconds of running, 30 seconds of walking, and so forth. Try to arrange this exercise so that the slow periods give you sufficient rest to do the subsequent activity. In the first cycle you worked with a pulse rate increased by 60 percent, but now the training pulse rate (TTP) should be increased to 70 percent in the fast segments of the 6-minute training period. In order to increase the pulse it is necessary to increase the speed of movement. But how much? Your body will suggest the optimal speed to you. The pulse should be taken every 2 minutes. Do not try to exceed the 70 percent and do not be disappointed if you cannot meet this condition immediately. Do it in the next couple of minutes.

The Third Step

You are "gathering momentum" up to 80 percent of your maximum efforts. This is energetic, rapid training. But it will be happening in a weakened condition. You will not be able to drive rapidly if you begin to put on the brake.... Excess strain acts on the organism like a brake. In order to teach the muscles to wear themselves out, is necessary to strengthen them.

The preceding training steps have already done this partially, but the training will be effective if the mass of muscles, their endurance and their

strength are trained all at the same time. And so we do the following exercises in sequence:

1. Presses. Again presses, but this time they are different. You should make the exercise difficult enough for you so that you will not be able to do more than five presses at one time. It is necessary to raise the legs, placing them on a chair, table or stair, and in the final stage, even against the wall. You can ask someone to press on your back while performing the exercise. Ideally, the exercise should be so difficult that at first you will be able to do it only once. With this same degree of difficulty you will have to increase it to five repetitions.

2. Sitting-lying down. The position is the same. Lean back enough so that you can maintain the position for at least 5 seconds without having your muscles tremble. Then lie on the floor and rest. How do you increase the load that has been reached? Raise your hands over your head and hold a weight in your hands. To begin with, it will be enough for you to hold one volume of an encyclopedia in your hands when they are crossed over your chest. We assure you that you will soon be able to raise the book over your head.

When you finish the bends, do the presses. Then again "sit-lie" and then again the presses--do each exercise three times in sequence. At first it will seem to you that you have reached the limit and you are even panting, but this will last only a couple of minutes. It is remarkable that in the third week you will be doing exercises which you could not even dream about during the first week.

Do not exceed your TTP. It should now be 80 percent of 220 minus your age.

3. And now interval training again. It takes 8 minutes, but you will have even more energy. Begin the exercise with the TTP of the second 8 weeks and work at this rate for 15 seconds. During the next 15 seconds increase the rate so that it reaches the TTP of the third period of training. Continue to alternate these for 8 minutes. It might take you 2-3 minutes to increase your pulse. Take your pulse after 2, 4 and 6 minutes, and make the necessary adjustments. The key to success lies in exhaustion. Remember the exercise for lowering the pulse rate at rest and before exercising try to relax. During the time of the exercise use the same method. For example, begin with a normal degree of loading and gradually increase the load, imagining that the load is hanging from your ankles and then "a big bear has grabbed you and thrown you down on your back." Then you will be severely strained, "get rid of the bear," relax your muscles and let the strain disappear. The goal is to drop below the level of strain at which you began.

Farewell

Let us say that the second 8 weeks have passed and you have managed to do all the exercise. Now you are in condition. What should you do with those

qualities you have acquired? You can engaged in any kind of sport, you are ready for any load you may encounter in daily life, and you can engage in any activity that brings you pleasure. But, as before, you must meet five basic requirements: stretching, 2 hours of standing on your feet, lifting weights, a 3-minute load with an increased pulse rate and burning 300 calories.

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BOOK ON INTERNATIONAL SOCIALIST ECONOMICS REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 196-212

[Review by D. M. Kazakevich, doctor of economic sciences, professor, Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk), of the books "Problems of Economic Planning"; "The Economic Mechanism for the Functioning of the Socialist Economy"; "The Information and Technical Base, Organizational Structures and Legal Support for Management of the National Economy," 1982-1983, publishers: Akademie-Verlag, Berlin; Ekonomicheskoye i yuridicheskoye izdatel'stvo, Budapest; "Ekonomika", Moscow; "Akademiya", Prague; Partizdat, Sofia. The books were written by scientific collectives from Bulgaria, Hungary, the GDR, Mongolia, Poland, the USSR and Czechoslovakia and were prepared for publication by the editorial board consisting of representatives from these countries. The editors in chief: N. P. Fedorenko (entire edition), Ye. Z. Mayminas (first book), N. Ya. Petrakov (second book), V. Shprukh and Yu. A. Oleynik-Ovod (third): "International Experience in Improving the Socialist Economic Mechanism"]

[Text] The Problem Commission for Multilateral Scientific Cooperation of Academies of Sciences of the Socialist Countries on Problems of Improving Planning and Management of the National Economy published a series of monographs which generalize the results of the theoretical research and international experience in improving the socialist economic mechanism.

Considered below are two of them which are devoted to problems of planning and the economic mechanism for the functioning of the socialist economy and which are in an organic unity.

The utilization of international experience in the organization of planning and management of the socialist national economy is becoming an increasingly important general reserve for increasing the effectiveness of public production and intensifying the economic development of the socialist countries. Therefore joint theoretical research and work for generalizing the experience that has been accumulated are extremely crucial.

Usually in joint publications of this type on problems of planning and management, after the introductory generalizing chapters follow chapters which

are devoted to a description of the experience of individual countries. In these monographs all of the sections and chapters adhere to the principle of joint scientific work and collective authorship by specialists from various countries. This was provided through the unity of the scientific positions of the authors regarding the principal issues that were under consideration and it made it possible to retain in the books the structure of presentation that is conditioned by the internal logic and the connection among the problems of planning and economic management that were treated.

The Planned Nature of the Economy and Planning

In planning, as the core of planned management of the economy, one finds the most complete manifestation of the principal common ground of planned management of economic and social development in the socialist countries. It is conditioned by the unity of their socioeconomic structure and the political basis of the society, and the common ideological and theoretical ground, which is based on the teachings of Marxism-Leninism.

At the same time, for each of the socialist countries there are typical features in national economic planning, and sometimes essential ones, which are related to the specific conditions and factors in their development and the corresponding peculiarities of the model of the economic mechanism as a whole. The countries are in various stages of socialist construction, they differ in terms of their levels of economic and social development, and they have peculiarities which are brought about by the degree of dependency on foreign economic ties, the scale of the country, demographic factors, natural conditions and so forth. In the CEMA countries there are differences in the setting of planning goals, the determination of priorities in the distribution of resources, the ways of informing the responsible parties of the assignments, and the methods of coordinating the centralized tasks and interests of the economic units. While concentrating attention on the basic and common features of socialist planning, the authors at the same time disclose the specific features in individual countries.

The planned nature of the socialist economy presupposes coordinated development of all units of the unified national economic complex and elements of the social system. As the authors note, a one-sided approach to maintaining proportionality--solely in the sphere of production with the help of natural balances--cannot provide stable balance of the entire economy and effectiveness of the reproduction process as a whole. The majority of the ties in the economy, among enterprises, and also in the distribution of objects of consumption have not only a natural-substantial, but also a commodity-value form. The most effective utilization of the resources that are transferred to the economic units is possible only under the condition that they are granted a certain amount of cost accounting [khozraschet] independence and active utilization of commodity and monetary relations. "Since in a socialist economy commodity and monetary relations operate within the framework that is typical for the process of public reproduction of the planned element, and are subordinate to it," write the authors, "their functioning cannot be counterposed to the degree of planning and, on the contrary, the nature of planning, which is directed toward the best possible satisfaction of public needs, cannot be realized under socialism without the

functioning of commodity and monetary relations" ("The Economic Mechanism for the Functioning of the Socialist Economy," p 24).

In the theoretical-methodological part of the monograph concerning planning, principles of socialist planning are formulated and disclosed, including one of the most important ones--democratic centralism in the development and implementation of the plans. Here it is emphasized that "centralization means unified planning for the entire national economy as an integrated system and does not simply predetermine the degree and forms of regulation of the activity of elements of this system." By strengthening of centralized foundations they "do not mean that central agencies will take on the solutions to an ever greater number of economic problems; on the contrary, they are speaking about leaving within the realm of their competence the solution to a smaller number of the most important, strategic problems, but these problems should be solved more substantially and effectively" ("Problems of National Economic Planning," pp 30-31).

Among the main areas for improving planning which were singled out in the monograph as being the same for all socialist countries special attention was devoted to questions of the comprehensiveness of the development of the national economic plan, its scientific substantiation and balance, and its orientation toward the final national economic results.

Under modern conditions the increased complexity of socialist national economic planning can be characterized by a whole number of aspects of planning activity:

the achievement of a higher degree of unity and interaction among social, economic and production-technological planning, and an increasing orientation of plans toward solving sociopolitical problems;

deepening of the coordination of goals of the national economic plan with labor, material, currency-financial and information resources;

more complete accounting in the plans for the capabilities of scientific and technical progress;

more complete coordination of territorial, branch and functional planning (planning of labor, capital investments, material and financial resources, science and technology, raising the standard of living of the people, environmental protection);

a higher degree of coordination of plans of various levels: development of the national economy, of branch and territorial economic units, production associations and enterprises;

deepening of the combination of long-range (long-term and five-year) and current (annual) planning;

more complete accounting in the planning for interbranch ties which are of a scientific and production-technological nature.

Improvement of Methods and Organization of Planning

The monographs discuss in sufficient detail the peculiarities of modern organization of the planning process in various countries, the role and content of the long-term, five-year and annual plans, and methods of coordinating them. And this analysis is culminated with a disclosure of the overall progressive tendencies, which consist in the following: the plan of greatest duration is developed with a breakdown which corresponds to the planning period of the least duration. At the same time these planning processes move relative to one another in such a way that first begins the development of the long-term plan which envisions the solution to problems and the achievement of goals of a strategic nature, and then--the five-year plan for the first 5 years of the long-term future, and after it--the next current plans. In the five-year plans they concretize the long-term strategy and the stages of the achievement of the main long-term socioeconomic goals of development and provide for the achievement of five-year stages with the help of planned investments and other most important conditions and factors of reproduction. They carry out regulation of economic normatives with an extended effect. The five-year plan envisions the necessary and progressive structural changes in the economy, at the same time providing for a dynamic balance in the national economy. In the current plans they regulate on the spot the distribution of production resources on the basis of the five-year plan, and the sequential implementation of assignments which they provide. Every 5 years, because of the development of a new five-year plan, this complete planning cycle is started over again. Moreover, the long-term plan which sets the overall goal orientation of socioeconomic development, is moved 5 years forward.

In the majority of socialist countries the assignments of the five-year and current plans are submitted to the ministries and cost-accounting economic units in the form of a certain number of directive indicators and normatives. But, as the experience of individual countries, for example, Hungary, shows, centralized socialist planning and the mandatory nature of state plans for the development of the economy can also be provided without dividing up the majority of assignments of the national economic plans among the ministries and enterprises. In this case among the economic units, ministries and planning agencies there is a mutual exchange of information during the process of work on the plans for the national economy and the cost-accounting units. Only the assignments of the state plan which are related to the fulfillment of commitments under foreign economic ties, the satisfaction of repeated needs, the implementation of the most important national economic programs and the utilization of special-purpose state capital investments are addressed to particular agencies. The system of economic normative-regulators (prices and wage rates for state resources, normatives that regulate the average wages and deductions of part of the gross income into the state budget and so forth) which are approved in the state plan and are periodically adjusted, in the hands of the state serve as means of indirect centralization of planned management of the processes of the functioning and development of the economy and provide for meeting the most important conditions of socialist planning--the mandatory nature of assignments of the state plan for the development of the entire national economy.

State planned management, as experience shows, is effective only in combination with independence of the lower units of the economy when adopting some of the economic decisions. Inclusion in the sphere of direct state regulation of functions inherent in the level of the cost-accounting units of the economy does not strengthen, but, on the contrary, weakens centralized planning. Concentration in the hands of the state of only the most important economic decisions in combination with indirect regulation of the activity of the enterprises makes centralized planned management more flexible and better.

The overall tendency consists in reducing the number of unmediated directive planning indicators and normatives that are assigned to particular enterprises (which pertains to means of direct state regulation) and the increase in the role of nonspecific economic normative-regulators and other economic levers in the centralized planned management of the economy in socialist countries.

Planning includes prognostication as one of its points of departure. The first of the monographs being reviewed gives the results of theoretical research and generalizes modern experience in the development of predictions of the development of the society and the national economy in socialist countries--demographic, having to do with the utilization of nature, social, and scientific-technical. Being a part of the planning system, prognostication performs its own specific functions in this system--probability, variant (alternative) foresight and measurement of objective patterns in socioeconomic development.

Coordination on the Plane of Goals and Resources

A separate chapter in the book on planning is devoted to the initial point of the development of national economic plans--the determination of socioeconomic goals for the planning period on the basis of materials and data from scientifically substantiated predictions, which are based on the relationship between demands and resources. In the special-purpose stage of planning they concretize and provide details concerning the overall formulation of strategic socioeconomic goals for the development of the country over the long-range future, establish a complex of goals for the system of national economic plans--long-term and current (annual), they determine the level of satisfaction of public demands during the planning period in close coordination with the resource potential, they single out the problems that are to be solved with the help of the development and implementation of comprehensive national economic programs, and they form the concept of the long-term plan for the country's economic and social development.

Based on the initial formulations of public goals, one establishes the normative structure and volume of the target final product (the part of it which is directly related to the realization of the established goals of the society). After this one considers alternative flows for the utilization of resources with an orientation of the economy toward obtaining the given final product while maintaining the balance and stability of economic development. Here it is especially important to maneuver capital resources which, on the one hand, are part of the final product and, on the other, are a basic (controlling) lever for future planning. Varying the utilization of capital and other most important resources determines the variants of the trajectory

of the development of the socioeconomic system from the initial condition (at the time of the adoption of the planning decision) as a whole. Each variant of the trajectory is made to correspond to a particular level of satisfaction of various specific needs at a fixed moment in time. The selection of the best trajectory is made according to a particular criterion of socioeconomic effectiveness.

In the real process of planning the goals and resources form the integrated object of planning. Planned development of the resource potential should be directed not only toward increasing the quantity, but primarily toward raising the qualitative level of the resources and the effectiveness of their utilization.

A number of laws have been formulated, which determine the proportions of the development of the resource potential:

more rapid development of all elements of the resource potential as compared to the growth of labor resources which provide for practically full employment of the able-bodied population, a constant increase in the effectiveness of the utilization of labor resources on the basis of a steady growth of the resource supply for labor;

more rapid development of the material resources of the society as compared to the dynamics of the utilization of nature, which reflects a need for fuller utilization of natural resources when they are limited;

more rapid development of fixed capital as compared to the increase in labor resources and material supplies, which provides for greater technical availability for labor and more complete utilization of material resources;

more rapid development of the scientific and other information potential as compared to the other kinds of resources, which provides for constant improvement of the quality of all kinds of resources.

The dynamics of the resources that are not reproduced in the process of economic circulation are determined mainly by methods of prognostication on the basis of an analysis of internal patterns for their development. Predictions of the dynamics of labor and natural resources and scientific-technical discoveries occupy an especially important position in the process of long-term planning, since the process is related to the development of these resources are, as a rule, long-term in nature.

But the dynamics of fixed capital and current material resources depend directly on the level of effectiveness of the utilization of the resource potential. Therefore the planning of the increase in the volume of these resources should be preceded by a determination of the possibilities of increasing the effectiveness of the utilization of resources, taking into account the most important tendencies in scientific and technical progress and also the possibilities of improving the organization of production and the methods of planned management of the economy. A determination of the dynamics and structure of the reproduced resources, taking into account the possible

scale for increasing the effectiveness of their utilization, is especially important in medium-term planning.

The material-substantial structure of resources of the fund for expanded reproduction essentially influences the interbranch proportions of the means of production. One of the characteristic tendencies of the change in this structure is an increased proportion of resources which are directed toward expanded reproduction of the active part of fixed capital (machines, equipment and so forth) as compared to the passive part (buildings and structures). This tendency is one of the basic factors which bring about the need for more rapid development of machine building. The material-substantial side of expanded socialist reproduction should be organically coordinated with the other side--having to do with value. The planning of physical proportions must be coordinated with the planning and regulation of prices, financing and granting of credit, taxation, deductions and the policy for expending profit, wages and other incomes. The monetary and financial flows and the proportions are not only passive reflection of the material and substantial ties in the national economy. They have a certain independence, which should also be taken into account in financial and credit planning.

The distribution and redistribution of the national income on the basis of an evaluation of the expenditures and results with the help of the financial and credit mechanism serve as a most important means for economic incentives for economic units and workers. Therefore it is necessary to coordinate all components of this mechanism and make the rules of management agree so that they will contribute more fully to the realization of the planned goals of socioeconomic development.

The Branch, Territorial and Program Sections of the Plan

With respect to the branch aspect of planning, the book takes note of the peculiarity that at the national economic level of work on the plan in socialist countries the tendency is for the main efforts to be concentrated on strategic problems of dynamic and balanced development a limited number of multibranch economic complexes, and not hundreds of individual branches.

Another one of the modern tendencies is the increased attention in planning that is paid to the spatial structure of the economy, to spatial development of the productive forces of the society. The significance of territorial planning is increasing because of a number of factors.

In the first place, a larger range of social problems is solved and the social orientation of the plans is stronger. Improvement of housing conditions, protection of the health of humans, trade and consumer services, more complete satisfaction of the demands for education and culture--all these social problems are included in the unified complex of living conditions which should be developed harmoniously in each territorial unit, and by its nature planning of its development requires primarily a territorial and not a branch approach. In the second place, the role of territorial planning increases because of the increasing load on the natural environment and the impossibility of protecting it through branch planning alone. In the third place, the very development of production of each branch depends to an ever-increasing degree on the

conditions for labor and life, the possibilities of attracting skilled workers, contacts with scientific and planning institutions and other factors which are closely related to the socioeconomic development of both territories on which the enterprises are located. In the fourth place, in modern production greater significance is attached to objects of the infrastructure, the effective functioning and development of which are provided with the creation of territorial multibranch infrastructural production complexes.

The general and particular features of the organization of the process of territorial planning in various socialist countries are also discussed in the monograph.

The monographs being reviewed generalize the theoretical research and the experience of socialist countries in the development and application in national economic planning of comprehensive programs and their coordination with other divisions and cross-sections of the plan.

The target-program method is based on the realization of the goal aspect of the plan, the ranging of the goals from the standpoint of the distribution of resources and their most effective utilization with an orientation toward the final national economic results. It is used in combination with the branch and territorial aspects of the plan and in close interconnection with balance and other methods of planning.

The program should be regarded as being coordinated in terms of resources, responsible individuals and time periods for the completion of a complex of planning measures which are varied in nature (socioeconomic, production, organizational, scientific-technical and so forth), which provide for the achievement of the goals which are most important for the development of the socioeconomic system, whose effective and prompt realization will increase the capabilities of the existing organization of branch and territorial management and require, as a rule, an essential change in the existing proportions, structure and rates of development of the spheres of the national economy that are involved. In the complex of measures of the program one should also include the creation of organizational, economic and other conditions that guarantee its fulfillment and the creation of necessary management agencies or change in the functions of existing ones, the creation of particular conditions for financing and granting credit, the allotment of resources, incentives and so forth. The programs are formed as links in a sequential chain of national economic planning: goals of social development--problems--programs--plan. The problems are characterized by the ratio between the level achieved and the goals of long-range social development, and the programs are an instrument for solving the most important problems that are advanced.

Programs are developed in the CEMA countries primarily in those areas of socioeconomic and scientific-technical development which out of various considerations are determined in the given stage to have priority, they require additional time periods for realization, and they must have close interbranch and interdepartmental coordination of many planning agencies and administrations and involve considerable expenditures of capital investments, financial funds and serious kinds of resources. The program approach is especially necessary when it is impossible to solve the problem within the

required time periods at the existing rates, with the existing proportions or with the structure of development of the economy or established economic ties.

The target program, as a rule, is directed toward carrying out the transition process in reaching a qualitatively new condition, as distinct from the majority of plans which are oriented, as a rule, toward maintaining a process that has been established in the management system. From the content of these positions it is quite obvious what the connection is between target program planning and intensification, which requires a structural change in the economy and an entire complex of transition complexes in various units.

At the present time the utilization of the target-program method is advancing to a new and higher level. From the development of individual national economic programs we are changing over to one-time and mutually coordinated program solutions to a number of the most important national economic problems. Complex problems are developed from the very beginning as an organic part of the national economic plan, within the temporal and procedural framework of the process of drawing it up. This policy is becoming more and more necessary since the complex of programs that are being carried out at the same time in many cases requires planned distribution of considerable volumes of capital investments and other resources.

Relying on the experience of various countries and the results of research, the authors discuss in detail the procedure for developing comprehensive national economic programs and the arrival at the program aspect of the national economic plan.

Scientific and Technical Progress and Planned Management

A good deal of space in the monographs is allotted to problems of scientific and technical progress in national economic planning and management, and the bases for determining the unified national economic policy are considered proceeding from the cycle: "Demand--Production--Science--Technology--Production--Demand," the content of genetic and normative prediction of scientific and technical development and the process of development of programs for scientific and technical progress in the national economic plan.

There is an extremely detailed presentation of the tasks, content and principles of the Comprehensive Program for Scientific and Technical Progress which was developed in the USSR for 20 years before preparing the next five-year plan. Its tasks include:

prediction of the main directions for scientific and technical progress and their influence on socioeconomic processes;

establishment of the priority of individual directions for the development of science and technology in the branches of the national economy and the distribution of material, labor and financial resources among the directions for scientific and technical progress;

the development of immediate measures included in the five-year plan which contribute to the implementation of the long-term scientific and technical policy.

They also demonstrate the general principles and peculiarities of the preparation of target scientific and technical programs in the CEMA countries, methods of determining the socioeconomic effectiveness of new technical equipment, forms and methods of financing scientific and technical progress, methods of providing for high cost-accounting effectiveness of the output of new means of production and material incentives for the development of new technical equipment and the most rapid assimilation of its production.

Planned Price Setting

In the sections devoted to economic methods in planned management of the socialist economy basic attention is devoted to price setting, the problem of payment for economic resources under the conditions of cost accounting, economic evaluation of natural resources, forms of distribution of the gross income of cost-accounting units on the basis of the normative method, and factors in increasing the economic incentives of the enterprises to establish effective foreign economic ties.

Relying on modern research in the countries and international experience, the authors formulate a number of requirements for price setting and directions for its improvement:

the transformation of price setting into an important constituent part of the development of the national economic plan;

the inclusion in the production cost of the products both the prices of complete expenditures on reproduction of the labor force and more complete reflection of expenditures on the extraction of raw materials;

the dependence of the amount of profit included in the prices on the ratio in the branches of production between labor and production capital, that is, the technical availability for labor;

the inclusion of rent payments in the prices and the equalization, with the help of this form of distribution of profit, of the conditions for the economic activity of enterprises using natural resources which have various degrees of effectiveness;

accounting in price setting for the influence on the internal price system of the dynamics of the ratios of world prices;

accounting in the prices for the degree of satisfaction of public needs in the products, particularly the innovation effect from the assimilation of the output of new means of production, distributed among participants in the innovation process;

A combination of price stability with their flexibility, planned utilization of prices is one of the factors in balancing supply and demand for various kinds of products;

Provision of an organic correspondence between the system of prices and the organization of the financial-credit system, particularly between the normative for the determination of profit as part of the prices and the average level of loan interest;

the equalization of the internal price systems of the CEMA countries.

The planned nature of the socialist economy requires centralized regulation of the price-setting process as well. It does not at all follow from this that there is a need to establish centrally the prices for all goods and services that are produced. The prices for the main kinds of equipment, raw material and energy should be established centrally on the basis of figures concerning the national economic needs and the availability of resources. The prices of these basic "input elements" of the economy exert an influence on the entire process of price setting and on all value proportions. For many series-produced items for which the public demand has been satisfied it is effective enough to have mandatory norms for price calculation and consistent monitoring of their fulfillment with decentralized establishment of prices.

From the standpoint of the requirement for flexibility of prices it is incorrect to put off essential changes in prices until the periodic revisions (reforms) of prices. Under the conditions of the scientific and technical revolution changes in production conditions and sales conditions take place within shorter time intervals. A failure to change prices forms a lack of correspondence between them and the socially necessary expenditures of labor, and therefore the prices cannot fulfill their functions. The way out of this situation is more flexible adaptation of prices to the changing conditions, including through partial price changes.

Management of the Investment Process

The books devote a considerable amount of attention to planning the investment complex and controlling the investment process. The investment process includes, in addition to the construction industry, the construction materials industry and machine building, the production of construction materials, although the latter is an individual multibranch economic complex. It seems that one should discuss, rather, the closely interconnected consideration of the investment complex and the complex of construction materials when planning the investment process.

It substantiates the need and discusses methods of unified planning of production activity and capital construction, the introduction and modernization of fixed capital and the provision of production facilities with labor force.

The economic mechanism of the investment activity in all of the CEMA countries includes various methods of management, which reflects a degree of centralization in decision-making and financing. Directive assignments are

established mainly in the areas that are of national economic significance and they serve to solve large interbranch problems. As the creative initiative and material responsibility of the enterprises and associations increase, there is also an increase in the role of economic levers and stimuli, which exert an indirect influence on the growth of effectiveness in the investment sphere.

Improvement of the investment mechanism requires the determination of the optimal proportions between various sources of financing capital investments. Budget funds are allotted for the construction of facilities which the enterprises cannot finance. Bank credit plays various roles in the financing of capital investments in individual countries, depending on the degree of dissemination of cost-accounting principles in the activity of the enterprises and the methods of distribution of the bank's investment funds. An increase in the role of investment credit, bank sanctions and benefits, and also the bank requirements on the effectiveness of capital investments create favorable conditions for increasing the effectiveness of capital investments.

In certain countries the majority of investment sources are concentrated in the hands of individual branch associations and ministries. In a number of countries these measures exert a favorable influence on the concentration of capital investments, but at the same time they have somewhat weakened the economic independence and responsibility of the enterprises for the final results of production and investment activity. The general tendency is for an increase in the proportion of internal funds of cost-accounting enterprises and bank credit in the financing of capital investments.

The books discuss in detail the experience of various socialist countries in substantiating the plan for capital investments at various levels of the economy and methods for determining their effectiveness. They also show the experience of various countries in combining various sources of financing. Of particular interest is the experience in allotting state investments on a competitive basis, not only as subsidies, but also as interest-free credit. The mechanism of bank credit and the role of banks in controlling the investment process, and also principles of cost-accounting self-financing of capital investments are discussed in detail.

The Organizational Structure of Economic Management

The authors think that the production association, while it is a new form of enterprise, does not form a new economic category, but is a variety of an enterprise which corresponds to the modern level of development of productive forces. The significance of the new form of the basic unit of the national economy for the development of the system of management is conditioned primarily by the evolution of its functions.

The changeover to highly effective economic associations does not preclude the functioning of medium-sized and small cost-accounting enterprises. One must not confuse the concepts of "small enterprise" and "small production." The application at small enterprises of modern technical equipment and comprehensive mechanization and automation provide for economic effectiveness that is close to the level found in large-scale production. This means that

they essentially become small structural parts of large-scale production, assume the economic features of the latter, and are organically included in the system of large-scale machine industry. A necessary condition for this kind of transformation is a deepening of specialization, a limitation of the list of products produced, and the establishment of well-substantiated cooperative ties. All of the CEMA countries devote a great of attention to searching for optimal forms of combining large and small enterprises.

As the authors note, the practice of the socialist countries is now generating a new form of interrelations in business--the form of contractual relations between higher and lower units of management (right up to the upper stages of management) and mutual commitments among them. The development of mutual responsibility along the vertical (including material responsibility), on the one hand, increases the economic incentives for intensification of production at the level of the cost-accounting units and, on the other, leads to increased balance and stability of the plans and counteracts cases of establishment by the higher agencies of insufficiently substantiated assignments for the enterprises or changes in previously adopted plans (if this leads to a decline in the effectiveness of production).

The development of the economic incentives and responsibility of the ministries can proceed right down to the organization of their work on the basis of the principles of cost accounting. In the works being reviewed it is noted that the changeover of branch ministries to cost accounting forces them to direct their efforts toward achieving the best ratio between the utilized resources and the results of economic activity at the level of the branches. At the same time cost accounting on the scale of the branch involves the danger of deterioration of cost-accounting principles for the activity of individual enterprises, especially when accounts with the budget begin to be kept for the branch as a whole. It seems that complete cost accounting at the branch level also has a number of serious negative consequences that are not pointed out by the authors, as a result of which it is unacceptable in the final analysis. In the opinion of many economists, only certain elements of cost-accounting relations are expedient at management levels higher than the basic cost-accounting unit of the economy--the enterprise.

The books being reviewed also consider other extremely important elements in the socialist economic mechanism and directions for improving it, and in particular they discuss problems of the utilization of nature in planning and economic management, methods of economic evaluation of natural resources and the determination of rent payment rates for their utilization, problems of cost-accounting regulation of wages within the framework of the distribution of all of the gross income of the cost-accounting unit on a normative basis, the construction of normatives for the distribution of the net profit of the enterprises, and so forth.

The published works have summed up many years of joint economic research on the part of academies and sciences of seven countries which was coordinated by the Problem Commission for Multilateral Cooperation. The monographs have been written on a high scientific level, they have great information content, and they comprehensively graft the process of improvement of the economic mechanism in the countries of socialism in the modern stage. Their

publication will contribute to mutual exchange of positive experience and to the solution of problems of improving planned management of the economy in socialist countries.

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BOOK ON MANAGEMENT DECISIONS REVIEWED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 212-214

[Review by V. L. Makarov, corresponding member of the USSR Academy of Sciences, director of the All-Union Scientific Research Institutes of Problems of Organization of Management (Moscow) of the book "Ekonomicheskaya effektivnost' upravlencheskikh i khozyaystvennykh resheniy. Spravochnik" [Economic Effectiveness of Management and Economic Decisions. Reference Book], by Ye. G. Yakovenko, V. F. Gapuchenko, Yu. S. Karabasov and A. V. Garbunov, Moscow, "Znaniye," 1984, 240 pp: "Failing Directions in a Sea of Methods"]

[Text] The selection of economic measures according to the criterion of their economic effectiveness is an extremely complex and multilayered task. In our country from 1959 to this day, according to the estimates of the reference book under review, we have published more than 800 various methods and instructive guidelines for calculating economic effectiveness. It is clear that we need an inventory. The authors of the reference work, headed by Prof Ye. G. Yakovenko, have become the initiators of this work.

They have evaluated the potential accumulated in these methods, obtained a certain picture and now they are familiarizing the reader with it in a generally accessible form. The reference work makes it possible even for people who do not have special training in the area of evaluating economic effectiveness to be oriented in the immense sea of methodological documents. The book is intended for a wide range of readers: economists, technologists, planners, administrative staff workers, efficiency experts, inventors, teachers, students, lecturers and propagandists.

A large amount of preliminary work was needed. As a result of many years of research the authors compiled a list of examples from 500 sets of methods, grouped them and ranked them according to the frequency of consumption. It turned out that the most complicated thing was to single out from each of the methods the main content and present it as palatably as possible. Here it was necessary to take into account the strict limitations on the size of the publication and the maximum permissible number of lines for each set of methods. The authors, in our opinion, found the only possible compromise under these conditions: they took the very basic things from each of the

standard unionwide and branchwide methods for determining the effectiveness of expenditures, and the branch methods and instructions for evaluating the effectiveness were presented. They also informed the reader-users of the existing branch materials on the corresponding issues with the help of a bibliographical description.

In this combination of the presentation of the main points of certain methods with a list of the points of others and a bibliography of still others lies a considerable advantage of this reference work. But this is also a shortcoming. We see the advantage in the large amount of information in the publication. One must say that even specialists are learning for the first time from this work about the existence of certain methods and methodologies for determining the effectiveness of expenditures and the overall number of them. But the shortcoming of the reference work is that the authors give practically no algorithms for determining expenditures, the results of their compilation and so forth. So if you want to compare or calculate a variant of the economic effectiveness yourself, you will have to set the reference work aside and turn to the methods in their complete presentation. Of course, many specialists dream about having on their desk or in the memory of their computer a summary of all the methods that are used for determining economic effectiveness. But this is a task for the next stage of the work in this area.

Even the most superficial analysis of the entire mass of methods gives curious information for contemplation. For instance, more than 30 percent of these methods pertain to industry and only 9 percent to agriculture. One-tenth of all the methods are not approved anywhere and are only initiatives on the part of the authors. The geography of the cities in which the methods are developed is also interesting: in the overall list Moscow is mentioned 400 times, Leningrad--32, the capitals of the union republics--88 (including Kiev--40 times), Sverdlovsk--12, and Stavropol--14 times. More than 50 cities of our country have centers that are conducting development of methods for determining the economic effectiveness of capital investments.

During 1958-1965 they developed and applied in calculations of economic effectiveness of the expenditures of capital investments in the national economy 75 different sets of methods; during 1966-1970--129; during 1971-1975--157; during 1976-1980--216 and during 1981-1984--57.

Throughout the presentation the authors lead the readers to the idea that it is necessary to develop a unified system of methods and methodologies for determining the economic effectiveness of management measures, which would have a clear-cut common goal, a hierarchical structure, unified terminology and so forth.

And the last thing to which we would like to draw the attention of readers of the reference aid is the labor-intensive, painstaking work of the editors of the "Znaniye" Publishing House. They not only recognized and valued the important new idea--to publish a reference work on methods--but they also did an excellent editorial reworking of the initial material. In the reference work key words are singled out, abbreviations are introduced, a bibliography

is presented, recommendations are given to the reader regarding correct utilization of this aid, and so forth.

And so they have published a useful, generally accessible book which generalizes branch, department and special methods, methodological guidelines and instructions which exist in the national economy and are necessary to specialists. We wish that the authors would continue this useful work.

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READERS' RESPONSE TO MAGAZINE RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 215-216

[Article: "They Write to Us"]

[Text] Our work day begins when the head of the editorial office, Zinaida Germanovna Baglay, brings us from her office the regular batch of your letters. After they are registered they become ours.

We look at the envelopes which are decorated with postmarks and we are convinced that some of the letters have traveled a long path before ending up in the editorial office: they have been incorrectly addressed. And for this same reason some of them apparently do not get to us at all. Sometimes we ourselves are impressed by how a letter addressed to Novorossiysk ends up in Novosibirsk or how an incorrect street, building number or the name of the editorial staff does not keep us from getting the letter.

Sometimes the letter wanders through the offices simply because next to the address--Prospekt Akad. Lavrent'yeva, 17--they have not written: "EKO Editorial Staff." The fact is that in our large building there are many respected institutions, including other editorial offices. Look at the picture of the building on the title sheet of the magazine and you will see that it is too big for one editorial office in which few more than 20 people are working.

On the same title sheet is the address of our printing office. Some authors of letters prefer to send them there. But the printing office only prints the books and magazines. There are no editors there and the letters are not even opened there.

The letters are distributed to the editors for responses in keeping with the subject matter which they handle in the magazine. Therefore it sometimes turns out that you indicate on the envelope the name of one worker of the editorial staff while another one answers you. We admit that not everything addressed to the editor in chief ends up on his desk. But the most important proposals are definitely brought to his attention as are all complaints about the work of the editorial office.

"I have put off writing you for a long time even though I wish to ask,"--we sometimes read. We are glad that you have nonetheless found time to write. But what do they write about? There is a multitude of reasons for writing letters to the editors. From Moscow they write about the poor quality of meals in the eating institutions, from Leningrad--about the need to observe not only labor discipline, but also party and state discipline, from Kiev they report the low quality of loudspeakers, from Kutaisi--the arrangement and importance of the primary accounting for material values, from Alma-Ata--about how the problem of supplying the population with meat is being solved, from Tolyatti--about how there have been no serious theoretical developments on cost accounting, from Norilsk--about the evaluation of engineering and management labor.... But with all of this diversity of letters they can be divided into three basic areas.

The first are the most varied questions, from "What does the editorial staff think about the concepts of private and public property in Marx?" to "Where should my son go to school?" We try to answer all or almost all of the questions, even those which go beyond the subject matter of the magazine.

Sometimes the readers are interested in the introduction of innovations which have been discussed on the pages of EKO. We try as best we can to help--we put them in touch with the author of the article, give them as much explanation as possible, and so forth.

In the editorial mail there are many responses to articles, and they are sometimes written directly from an airplane or a train, without being put off until tomorrow. The editorial office receives many suggestions--from a new name for the magazine to the content of the last page of the cover. All of them are certain to end up on the desks of editorial staff workers, and the most interesting are discussed at planning meetings.

And so what should you write about? We have a simple viewpoint regarding this: about production in your life, about everything that bothers you, write whatever you can. We are aware that workers of the editorial staff are less interested in general considerations because it is sometimes difficult to understand which concrete situations have evoked a particular letter with such far-reaching conclusions.

We have had cases in which the letters which contain personal impressions and attempts to describe personal experience have opened up a new subject in the magazine and given a fresh turn to a discussion.

Below we are publishing several regular letters from our readers.

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READER COMPLAINS ABOUT MACHINE TOOLS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 217-218

[Letter from Sergey Leonovich, machine tool adjuster (Petropavlovsk, Kazakh SSR): "I Am Going to the Subsidiaries..."]

[Text] The first year when subscribing to EKO I saw that the magazine raises questions which bother not only managers of enterprises, but also workers. I read No 5 for 1984 and could not keep from writing. In this issue the general director of the Ivanovo Machine Tool Construction Association, V. P. Kabaidze, wrote: "The proportion of machine tools with numerical program control is only 5 percent. Therefore the growth of the machine tool fleet requires continuous increase in the number of workers" (p 183).

I would like to add: it is not only a matter of small number of machine tools with numerical program control, but also of their utilization.

I am an adjuster of the fifth rank and along with two students I service 25 robotized complexes. While we are going around adjusting one complex, frequently half of them are standing idle. It would be advantageous for the enterprise to hire several more skilled adjusters for this section, but where would they come from? The people who arrive are students or "specialists" who have never actually laid eyes on equipment like this. Theoretically the complexes we service release dozens of people, but in practice we do not manage to reach the intended productivity of the machine tools.

I love electronics and I am studying in the institute because this kind of technical equipment cannot be understood or mastered without engineering knowledge. I can spend endless amounts of time with these excellent machines. In brief, I feel that I am in my place. And it is a pity that I will have to leave. I do not know who will be left after me. I think that they will ruin a couple of machines. But still I am going to the subsidiary enterprise or I will be an uncategorized worker. At a construction site.

Obviously explanations are needed. We have a large enterprise with 15,000 people working there. Mountains could be moved with such a collective. During my 4 years nobody has insulted or offended me. Everything is normal. But when you leave after a shift your mood drops: the family needs an

apartment, the plant somehow releases and fills one building every 2 years. At the construction site they promise an apartment, even though I understand that it will take time for me to become useful there and for them to value me.

And think: it is disadvantageous for the enterprise to take for my position someone who is untrained and has a poor knowledge of the complexes. It is disadvantageous also for these complexes to stand idle. And it is even more disadvantageous to my country. So much labor has been invested and money spent in order to put the robots into operation at our plant! And, understanding this, I still must leave: it would seem that they have more need not of adjusters, but of subsidiary workers to haul bricks....

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READER WRITES ABOUT CHILD PAYMENT

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 p 218

[Letter from Aleksandr Tsinovoy, engineer-technologist (Dnepropetrovsk): "And for Less Labor--Full Pay!"]

[Text] In the articles on the reform of the secondary and vocational schools I consider the most unclear question to be the payment for children. The authors discuss how students are working at the plants. But how much are they paid? Or is it unpleasant to speak about this? Why? At the plants there is a fairly clear-cut system of payment for any kind of labor. And schoolchildren should be paid at the rates and tariffs that are in effect. Otherwise it seems to me that they will not care what they do and why. But the question is altogether different when it comes to paid labor. Of course, the students study without pay. But they are living in a society where money has not lost its function. And I personally place the question of the payment for their labor in terms of importance right after the question of the level of knowledge and discipline. Labor skills require more than just evaluations in points.

Correct material incentives for schoolchildren will also have an effect on the educational plane. For they will come to the plants and come to the brigades and there will be sharp conflicts because of the wages. Future workers should have an idea about more than just the money their parents give them. Honestly earned money has a great educational force.

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EXPERIENCE FROM JOINT ACTIVITY RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 218-219

[Letter from Simon Ageyev, shop chief (Moscow): "Is Everything Well in the Brigades?"]

[Text] As I understand it the main point of brigade organization of labor is to achieve better results with a smaller number of workers. But here is what happens in real life. In 1983 there were 15 people working in a brigade, and in 1984--13. The technological process had not changed and the equipment was the same as it was before. The wages in the brigade increased, and the percentage of overfulfillment of the norms also increased. When the work stations were certified this percentage was included in the certificate.

Here, in my opinion, is one of the sources of the contradictions between the managers of the shops and the plant divisions--the planning and economic and the labor and wage divisions. If the certificate for a work station includes the actual percentage of fulfillment of the norms, one can demand a reduction of the number of personnel during the next year. Will any manager do this? I think not. And if he does, he will not avoid a conflict with the brigade since their wages no longer depend on the number of personnel.

Another problem is the level of wages. When working with a single contract the increase in wages is more rapid than the average level for the enterprise. And the shop norm-setter ends up in a difficult position: if he does that which is required by the plant economic services, he will come into conflict with the brigades.

Another problem is that in certain cases brigade organization of labor can have a negative influence on the quality of the products. It is known that it is simpler and quicker to form a collective guarantee than collective responsibility.

And there are also several other interesting problems which will have be solved during the course of "brigadization." Conclusion No 1: it is necessary to approach brigade organization of labor very thoughtfully, without hurrying, and in a differentiated way and not through an order. And when the task "comes down" to expand the range of the brigades, a drive for expansion

begins. Who needs this? Thus a good large-scale matter can turn into a formal one, "for the report," and not produce the expected result.

The magazine could help us by publishing articles by specialists and managers who already have experience in brigade organization of labor, who can evaluate its advantages and shortcomings. Their ideas are very valuable for those economic managers who are in favor of changing over to brigades and have only an approximate idea of what they are. Hence also the conflicts in the brigades that have been created, and the fact that their work is not always effective.

Let the authors of several articles about brigades in EKO not be offended, but we sometimes feel that the authors are looking more frequently in the monographs of their colleagues than they are in the actual brigades. We invite them: come and visit us!

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DESIGNER'S THOUGHTS ABOUT WORK RELATED

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 4, Apr 85 pp 220-221

[Article by Oleg Kratov (Kharkov): "What a Designer of the First Rank in One Design Bureau Thinks About"]

[Text] In front of me is a desk, on the right a Kuhlmann table and on it a sheet of Whatman paper. I am sitting there and thinking. Yesterday I received an assignment from the boss: to develop a new plug in keeping with the scientific and technical program and long-range plan.

I am to draw it in keeping with all the rules of the drafting art with fine and thick lines--and it should be ready by noon. And it will work the way it is supposed to. I have experience, they gave me pencils yesterday, although this was a quarter late. This is what I would have done if I had been a young specialist, green and inexperienced, and did not know what lies behind the simple word "developed."

First I must obtain from the client a thematic card with the technical specifications and the card must be coordinated and approved. Then a schedule-order on a machine-oriented form in order to prepare for carrying out the experimental design work, where all stages of the work, from the technical assignment to the introduction are entered, broken down and coded, then the registration and information cards had to be developed and everything had to be sent to the central office. The schedule-order had to be coordinated for me at five levels, it had to go through four divisions of the technical administration and the chief had to put it in the mail (he communicates with the people about the post office) for approval.

And if I do not send the OST for typing, if I do not coordinate the card of the technical level for the highest quality category, if I do not submit the technical and economic substantiation, then instead of a positive resolution I will probably receive across the entire schedule-order: "Into the closet!" (our boss has a sense of humor).

But this is only the prelude. Then I have to a FSA (functional cost analysis). The TZ (technical assignment), TU (technical specifications), KU (card of the level).... etc, etc. but the RD (working documentation) is worth

something: I must satisfy 118 standards and gather 80 forms just from departments for the YeSKD. All of the materials and accompanying items have to be coordinated with the protocols: the screw--in Torzhka, the bolt--in Khabarovsk, the washer--in Baku, and the press-material--it is strange to think about it--in the village of Yubileyniy, and there are 36 of these in the country. Go and find which one you need! And everything from the TZ to the RD has to be coordinated and I have to travel everywhere. Have you been on a business trip long? And what about the tickets? Oh, 3 days and they will deliver them, and then because of an acquaintanceship, for a box of "Assortie"? And what about the hotels in Torzhka and Khabarovsk? What are you talking about? There is a congress of racquetball masters there?! And then a conference on containers? And what about you? Oh, 3 days at the station and then a tender-hearted old lady put me up for the day for 3 rubles? No questions.

Then, after suffering through all of this it seems like a holiday to submit it to the interdepartmental commission. Just think, some 47 kilograms of paper has been submitted. Trivia!

The chief, when giving me the assignment, hinted about a bonus. He says you work, you introduce it, you provide an effect--you will not be forgotten. For the time being I abandoned all these charts and cards, typing and schedule-orders, commissions and standards, coordination and shakeups. For 8 years indefatigably. This is not counting introductions. An introduction even on a computer is not counted. If you know Comrade Karas', Ivan Ivanovich, the director of the plant where they make the plugs, you will understand me. He took 16 years to introduce a cap for a wall plug. First he would not accept the documentation from the developer--he had not completely read one piece of information and his press broke, he could not find the bearings and then by mistake the press was written off and sent for scrap metal, and it took many years to acquire a new one, and then the head designer fell ill with whooping cough, and then the head technologist's daughter got married, and right before it was to be introduced it became clear that the chemists had stopped producing the plastic that was indicated the blueprints because it was outdated, and everything had to be started over again.

So it should not take less than 15 years for a plug either. The result, perhaps, will be that in 20 years I will receive a bonus and it will be like a gift in addition to my pension.

In front of me is the desk, to my right is the Kuhlmann table, and on it is a sheet of Whatman paper. And I sit and think: perhaps it would be better for me to go into consumer services, television repair? And when would it be best to do this, before vacation or afterwards?

Perhaps you have some advice for me?

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